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Basic Of Chemistry

TEST 1

1. **If the reactant or product of a chemical reaction can absorb UV, Visible or infra-red radiation then the rate of chemical reaction can be best measured by which one of the following?**

A: Chemical Method
B: Spectrometer
C: Graphical Method
D: Differential method

2. **The isomers must have the same:**

A: Physical properties
B: Molecular formula
C: Structural formula
D: Chemical properties

3. **If actual yield of a reaction is 75g while theoretical yield is 200g. Then % yield is?**

A: 37.5 %
B: 40 %
C: 50 %
D: 75 %

4. **The mass of 3 moles of sodium hydroxide will be?**

A: 28 g
B: 40 g
C: 80 g
D: 120 g

5. **Relative atomic mass of an atom is the mass compared to the mass of?**

A: Hydrogen taken as 1
B: Oxygen taken as 16
C: Carbon taken as 12.
D: Magnesium taken as 24.

6. **Empirical formula of $C_6H_{12}O_6$ is?**

A: $C_6H_{12}O_6$
B: CH_6O
C: CH_4O
D: None of the above.

7. If two atoms of the same elements have different atomic mass, then it can be concluded that?

- A: They are isotopes.
- B: They are isomers.
- C: They have same number of neutrons.
- D: They have different number of electrons.

8. Limiting reactant in any reaction is the one?

- A: That has more than 1 moles.
- B: That has less than one moles.
- C: That is consumed earlier.
- D: That limits the energy given out by the reaction.

9. All of the following statements are correct for 20 moles of water except ?

- A: It has 40 mol of hydrogen atoms.
- B: It has 20 mol of oxygen atoms.
- C: It has 20 moles of hydrogen atoms.
- D: It has 120.4×10^{23} molecules.

10. What is the ratio of the weights of one mole of carbon and magnesium?

- A: 1 : 1
- B: 2 : 1
- C: 1 : 2
- D: 2 : 3

11. How many moles of sodium are present in 0.1g of sodium?

- A: 4.3×10^{-3}
- B: 4.3×10^{-1}
- C: 4.01×10^{-3}
- D: 4.3×10^{-2}

12. If two moles of H_2 are allowed to react with two moles of O_2 to form water. The limiting reactant is?

- A: Hydrogen
- B: Oxygen
- C: None of them.
- D: Both of them

13. Which of the following is not an element?

- A: Carbon
- B: Helium
- C: Sodium
- D: Sand

14. Tick the correct statement.

- A: Molar volume of any gas is constant.
- B: Molar volume of oxygen at 0^o C is constant.
- C: Molar volume of any gas at 0^o C and 760 mm pressure is constant.
- D: Molar volume of any gas at a given temperature and pressure is constant.

15. 1 amu =?

- A: 1.6 x 10^{-23} kg
- B: 1.6 x 10^{-27} kg
- C: 1.6 x 10^{-31} kg
- D: 1.6 x 10^{-34} kg

16. If percentage composition of element X in compound Y is 11%. Then 200 g of Y would contain how many grams of X?

- A: 11 g
- B: 22 g
- C: 30 g
- D: Depend on the molecular mass of X.

17. Which of the following element would have the highest number of atoms?

- A: 1 mole of hydrogen
- B: 1 mole of sodium
- C: 1 mole of uranium
- D: All would have same number of atoms.

18. Which of the following is true about an atom?

- A: It is the smallest invisible particle in an element
- B: Smallest particle of an element which can undergo a chemical reaction
- C: It cannot be subdivided in to smaller particles.
- D: All of the above.

19. If we know the mass of one substance we can calculate the volume of other substance and vice versa with the help of chemical equation is called?

- A: Mass-mass relationship
- B: Mass-mole relationship
- C: Mass-volume relationship
- D: Mole-volume relationship

20. If 8.6 g of a compound has 2.5 g of oxygen. Then the percentage composition of oxygen is?

- A: 11 %
- B: 29 %
- C: 32 %
- D: 38 %

TEST 2

1. What is the mass of 5 moles of Sulphur dioxide? Atomic mass of S = 32.

- A: 320 g
- B: 380 g
- C: 400 g
- D: 420 g

2. Which of the hydrogen isotope has 2 neutrons?

- A: Protonium
- B: Deuterium
- C: Tritium
- D: None of the above.

3. When 8 grams (4moles) of H_2 react with 2 moles of O_2, how many moles of water will be formed?

- A: Four
- B: Five
- C: Six
- D: Three

4. The number of molecules in 22.4 dm^3 of H_2 gas at 0^oC and 1 atm are:

- A: $60.2x10^{23}$
- B: $6.02x10^{23}$
- C: $6.02x10^{22}$
- D: $6.02x10^{25}$

5. Diameter of atoms is of order?

- A: 0.1 nm
- B: 0.2 nm
- C: 0.3 nm
- D: 0.4 nm

6. Calculate the mass of neon from the provided spectral data?

(Percentage of $^{20}_{10}Ne$,$^{21}_{21}Ne$,$^{22}_{10}$ Ne are 90.92% , 0.26% , 8.82% respectively)

- A: 22.18amu
- B: 21.18amu
- C: 20.18amu
- D: 22.20amu

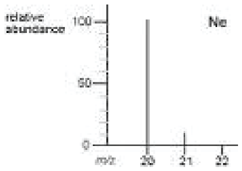
7. How many different isotopes are present in nature?

- A: 230
- B: 250
- C: 280
- D: 320

8. ***From a mixture of CO_2 and H_2 gases, CO_2 can be separated by passing the mixture through:***

- A: Water at high temperature
- B: Water under high temperature
- C: Cold water
- D: Acidified water

9. **A sample of Neon is found to exist as $^{20}Ne, ^{21}Ne, ^{22}Ne$. Mass spectrum of 'Ne' is as follows:**



What is the relative atomic mass (A_r value) of Neon?

- A: 20.18
- B: 20.28
- C: 20.10
- D: 20.22

10. **Empirical formula and molecular formula of a compound?**

- A: Are always same
- B: Are always different
- C: May be same or different
- D: Same only for the inorganic compounds.

11. **Which of the following contains more number of molecules?**

- A: 1 g of hydrogen.
- B: 1 g of carbon dioxide
- C: 1 gram of oxygen
- D: All of them would have same number of molecules.

12. **A polymer of empirical formula CH_3 has molar mass of 26000 $gmole^{-1}$. Its molecular formula will be?**

- A: Hundred times of empirical formula
- B: 200 times of empirical formula
- C: 500 times of empirical formula
- D: 2000 times of empirical formula

13. **What is the mass of 0.02 moles of $MgSO_4$? Molecular mass of $MgSO_4$ is 120.**

- A: 0.12 g
- B: 0.24 g
- C: 1.2 g
- D: 2.4 g

14. The volume of oxygen necessary to complete combustion of 20 litres of propane is? Equation of combustion is,

$C_3H_8 + 5O_2 \text{ --> } 3CO_2 + 4H_2O$

- A: 20 litres.
- B: 40 litres.
- C: 80 litres.
- D: 100 litres.

15. Carbon 14 has how many neutrons?

- A: 6
- B: 7
- C: 8
- D: 9

16. Carbon has how many isotopes?

- A: 2
- B: 3
- C: 4
- D: 5

17. If a compound has has 6.4 moles of X, 6.4 moles of Y and 8.5 moles of Z. Then the empirical formula of the compound is?

- A: XYZ_2
- B: $X_2Y_2Z_3$
- C: $X_3Y_3Z_4$
- D: $X_4Y_4Z_5$

18. An organic compound has empirical formula C_3H_3O. If molar mass of the compound is 110.5 $gmol^{-1}$,the molecular formula of this organic compound is (A, of C=12,H_1=1.008 and O=16).

- A: C_3H_2O
- B: $C_6H_6O_2$
- C: $C_3H_7O_3$
- D: $C_6H_6O_3$

19. In mass spectrometer, detector or collectors measures the:

- A: Masses of isotopes
- B: Percentage of isotopes
- C: Relative abundances of isotopes
- D: Mass number of isotopes

20. In the final answer of the expression: (29-20.2)(1.78 x 10^5)/1.37 the number of significant figure is:

- A: 1
- B: 2
- C: 3
- D: 4

TEST 3

1. If 10^{21} molecules are removed from 200 mg of CO_2, then the no. of moles of CO_2 left will be?

- A: 1.66×10^{-3}
- B: 2.88×10^{-3}
- C: 3.35×10^{-3}
- D: 4.26×10^{-3}

2. **Volume of CO_2 obtained from complete decomposition of 126 g $CaCO_3$ at STP is? Atomic mass of $CaCO_3$ = 100.**

- A: 22.4 litres.
- B: 28.2 litres.
- C: 30.7 litres.
- D: 34.1 litres.

3. **Which of the following statement is NOT true?**

- A: Mono-isotopic elements have only one isotope.
- B: Generally elements with even atomic number have more isotopes.
- C: Generally elements with odd atomic number have more isotopes.
- D: All isotopes of the same element have same chemical properties.

4. The empirical formula of a compound is CH_2. If the molecular mass of this compound is 42 gram, its molecular formula will be?

- A: C_2H_4
- B: C_3H_6
- C: C_4H_8
- D: C_5H_{10}

5. Non-stoichiometric compounds are formed by:

- A: Only alkali metals
- B: Only transition elements
- C: Only noble gases
- D: None of the above

6. A compound contains two elements X and Y percentage of X is 20 % (At.wt=40) and that of Y is 80% (At.wt=80). The empirical formula of the compound is ?

- A: XY_2
- B: X_2Y
- C: XY
- D: XY_3

7. Which of the following has the least weight?

- A: 2 g of Nitrogen
- B: One mole of C (atomic weight of C is 12)
- C: 1/2 mole of Sodium (atomic weight of Na is 23)
- D: 4 moles of H_2

8. The percentage of nitrogen in NH_3NO_3.

- A: 65%
- B: 35%
- C: 20%
- D: 58%

9. Two isotopes of an element X are ^{14}X and ^{15}X, respectively. If the average atomic mass of X is 14.0067, what is the percentage abundance of ^{14}X?

- A: 88.4 %
- B: 95.8 %
- C: 99.3 %
- D: 99.9 %

10. Which one of the following has maximum number of atoms of oxygen?

- A: 2 g of CO
- B: 2 g of N_2O
- C: 2g of H_2O
- D: They all have same number of oxygen atoms.

11. How many moles of magnesium phosphate; $Mg_3(PO_4)_2$ will contain 0.25 moles of oxygen atoms?

- A: 3.125×10^{-2}
- B: 1.250×10^{-2}
- C: 3.125×10^{-3}
- D: 1.250×10^{-3}

12. Air contains 22.4% oxygen. How many moles of oxygen atoms are there in 1 litre of air at standard condition?

- A: 0.01 moles
- B: 0.02 moles
- C: 0.04 moles
- D: Cannot be determined.

13. The approximate number of molecules in one liter of water is?

- A: 3.35×10^{23}
- B: 6.02×10^{23}
- C: 3.35×10^{25}
- D: 6.02×10^{25}

14. A sample of hard water contains 40 mg of Ca^{2+} ions per litre. The amount of washing soda (Na_2CO_3), required to soften five litres of the sample would be?
Atomic weight of Ca = 40 and Na_2CO_3 = 106.
Softening reaction is: $Ca^{2+} + Na_2CO_3 \dashrightarrow CaCO_3 + 2Na^+$

- A: 1.2 mg
- B: 5.3 mg
- C: 53 mg
- D: 530 mg

15. On heating the hydrated salt $MgSO_4.xH_2O$, it loses its water of crystalization. In an experiment it was found that when 0.2 mol of hydrated salt was heated 0.40 mol of water was lost. What is the molecular formula of the hydrated compound ?

- A: $MgSO_4.4H_2O$
- B: $MgSO_3.1/2\ H_2O$
- C: $MgSO_4.H_2O$
- D: $MgSO_4.2H_2O$

16. How many number of molecules are present in 9.8 g of ice?

- A: 6.02×10^{22}
- B: 6.02×10^{23}
- C: 3.01×10^{23}
- D: 3.01×10^{22}

TEST 4

1. **Hydrogen burns in chlorine to produce hydrogen chloride. The ratio of masses of reactants in chemical reaction**

   $H_2 + Cl_2$ ----> 2HCl is:

- A: 2:35.5
- B: 1:71
- C: 1:35.5
- D: 2:70

2. **If combustion of 0.8 g of a compound released 0.2 g of carbon dioxide. Then the number of gram atoms of Carbon in the compound is?**

- A: 6.8 g
- B: 4.3 g
- C: 0.56 g
- D: 2.7 g

3. **How many Chlorine atoms are there in 2 moles of Cl?**

- A: 2 x 6.022 x 10^{23} atoms
- B: 35.5 x 6.022 x 10^{23}atoms
- C: 6.022 x 10^{23} atoms
- D: 2 x 6.022 x 10^{22}

4. **Ozone (O_3) filters the cosmic rays of sunlight. How many oxygen atoms are there in 0.3 mole of ozone (molar mass of oxygen is 16 g/mol)?**

- A: 2.01 x 10^{23}
- B: 6.0 x 10^{23}
- C: 3.6 x 10^{23}
- D: 5.4 x 10^{23}

5. **Addition of electron in an atom (as shown below) is what kind of process?**

   B + e^- -----> B^-

- A: Exothermic
- B: Endothermic
- C: Isothermic
- D: Depends on the atom.

6. **The relative abundance of isotope of elements can be determined by?**

- A: X-rays
- B: Solvent extraction
- C: Mass spectrometry
- D: Chromatography

7. **A sample of an ionic compound contains 23 g Na, 38 g F, and 48 g O. The empirical formula of this compound is?**

- A: NaF_2O_2
- B: NaF_2O_3
- C: $NaFO_3$
- D: NaF_3O_3

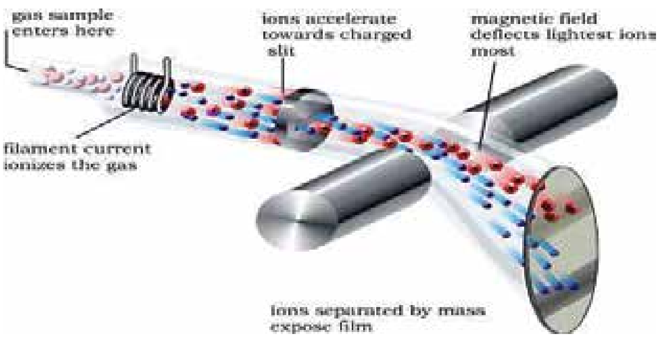
8. **What is the approximate number of molecules in 4.25 g of NH_3?**

- A: 1.0×10^{23}
- B: 1.5×10^{23}
- C: 2.0×10^{23}
- D: 6.0×10^{23}

9. **Each molecule of Hemoglobin is made up of nearly how many atoms?**

- A: 5000
- B: 7000
- C: 10,000
- D: 12,000

10. **The figure below shows which of the following processes?**

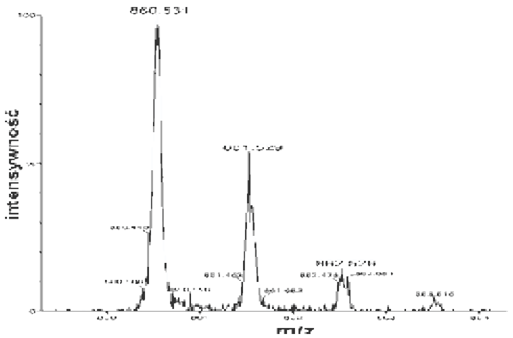


- A: Sublimation
- B: Chromatography
- C: Combustion
- D: Mass spectrometry

11. **Oxygen has how many isotopes?**

- A: 2
- B: 3
- C: 5
- D: 7

12. Element with the following mass spectrograph would have how many isotopes?



- A: 2
- B: 3
- C: 4
- D: More than 4.

13. Zirconium chloride reacts with magnesium to produce Zirconium.

$$ZrCI_4 + 2Mg \rightarrow Zr + 2MgCI_2$$

How many moles Zr would be produced if 0.2 mol of Mg metal is used in the reaction?

- A: 0.01
- B: 0.1
- C: 0.2
- D: 0.02

14. The molecular formula of nicotine is $C_{10}H_{14}N_2$ (molar mass = 162 g). The mass percentage of nitrogen in nicotine, is?

- A: 4.8 %
- B: 8.6 %
- C: 17.2 %
- D: 21.8 %

Gases, Liquids & Solids

TEST 1

1. The highest temperature at which a substance can exist as a liquid is called?

- A: Liquefaction temperature
- B: Joule Thomson temperature
- C: Ideal temperature
- D: Critical temperature

2. If pressure is increased by 2 times at constant temperature the volume shall?

- A: Increase two times
- B: Remain same
- C: Decrease by half
- D: Decrease by quarter

3. Value of gas constant R is?

- A: 1.987 J K^{-1} mol^{-1}
- B: 8.314 J K^{-1} mol^{-1}
- C: 62400 J K^{-1} mol^{-1}
- D: None of the above.

4. One mole of any gas at STP occupies a volume of:

- A: 22.414 dm^3
- B: 22.414 cm^3
- C: 23.414 dm^3
- D: 20.414 dm^3

5. The shape in which a crystal usually grows is called its?

- A: Habit
- B: Symmetry
- C: Cleavage plane
- D: Anisotropy

6. The volume of 1 mole of ideal gas at STP is?

- A: 0.022 liters
- B: 0.22 liters
- C: 2.2 liters
- D: 22 liters

7. The root mean square velocity of gases is inversely proportional to square root of their?

- A: Temperature
- B: Molar mass
- C: Pressure
- D: Volume

8. In the structure of NaCl, each sodium ion is surrounded by how many Chloride ions?

- A: 4
- B: 5
- C: 6
- D: 8

9. Movement of a gas through a small opening to a region of low pressure is known as?

- A: Diffusion
- B: Effusion
- C: Sublimation
- D: Condensation

10. All of the following substances are crystalline except?

- A: Ice
- B: Carbon (diamond)
- C: NaCl
- D: Plastic

11. How many types of crystal systems are there?

- A: 2
- B: 5
- C: 7
- D: 11

12. Molecular solids have which type of intermolecular forces?

- A: Dipole-dipole
- B: Hydrogen bonding
- C: London forces
- D: All of the above.

13. One mole of any gas at STP occupies a volume of:

- A: 20.414 dm^3
- B: 22.414 cm^3
- C: 23.414 dm^3
- D: 22.414 dm^3

14. Based on the type of bonds crystalline solids may be divided into how many types?

- A: 3
- B: 4
- C: 5
- D: 7

15. Molar heat of fusion is defined as?

- A: Heat absorbed by one mole of a solid when it melts into the liquid form at STP.
- B: Heat released by one mole of a solid when it melts into the liquid form at STP.
- C: Heat absorbed by one mole of a solid when it melts into the liquid form at its melting point.
- D: Heat released by one mole of a solid when it melts into the liquid form at its melting point.

16. Intermolecular forces where positive end of one molecule attract the negative end of the other molecule are called?

- A: Dipole-dipole forces
- B: Ion-dipole forces
- C: Dipole-induced dipole forces
- D: London dispersion forces

17. On the basis of regular arrangements of the 2constituents, the solids can be divided into how many types?

- A: 2
- B: 3
- C: 5
- D: 7

18. Plasma is ionized gas mixture which consists of:

- A: Ions and electrons
- B: Electrons and neutral atoms
- C: Ions and neutral atoms
- D: Ions, electrons and neutral atoms

19. Which one of the following gases is used by sea divers for breathing?

- A: Oxygen and Nitrogen
- B: Nitrogen and Helium
- C: Helium and Oxygen
- D: Helium and Hydrogen

20. Which type of forces is present in gasoline?

- A: Dipole-dipole forces
- B: Dipole-induced dipole forces
- C: Hydrogen bonding
- D: London dispersion forces

TEST 2

1. Which of the following is a covalent solid and a good conductor of electricity?

- A: Graphite
- B: Copper
- C: Iodine
- D: Both A and B.

2. Average translational kinetic energy E_k of one mole of gas molecule is given by?

- A: (3/2) (RT/N_a)
- B: nRT
- C: (1/2) (RT/N_a)
- D: (3/2) (RT)

3. Hydrocarbons do not dissolve in water because?

- A: They have hydrogen in them.
- B: They are polar compounds.
- C: They are non-polar compounds.
- D: Four electron in the outer shell of carbon reduces its solubility.

4. What is the pressure of 64 g O_2 enclosed in a cylinder of 20 litres at 27^oC?

- A: 0.2 atm
- B: 2.5 atm
- C: 7.1 atm
- D: 9.8 atm

5. Sublimation is used to purify which of the following?

- A: Ammonium sulphate
- B: Lead carbonate
- C: Sodium chloride
- D: Benzoic acid

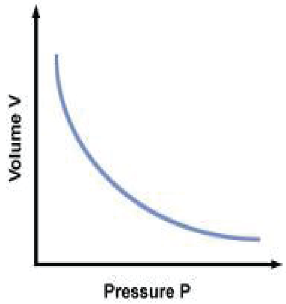
6. If hydrogen bonding of HF is stronger than that of HCl, which of the following is true?

- A: They both would have same acidity.
- B: HCl is more acidic.
- C: HF is more acidic.
- D: Acidity has no relation with hydrogen bonding.

7. If the volume of gas is 546 cm^3 at 0^o C. What would be increase in volume for 4^o C rise in temperature?

- A: 2 cm^3
- B: 4 cm^3
- C: 6 cm^3
- D: 8 cm^3

8. **The curve given below is an isotherm. This is the curve for which law?**



- A: Boyle's Law
- B: Charle's Law
- C: Dalton's Law
- D: Graham's Law

9. **In crystal lattice of ice, each O-atom of water molecule is attached to:**

- A: Four H-Atom
- B: One H-atom
- C: Two H-atom
- D: Three H-atoms

10. **The coordination number of Na^+ in NaCl crystal is:**

- A: 6
- B: 2
- C: 4
- D: 8

11. **C_2H_5OH dissolves in water because?**

- A: It is a hydrocarbon.
- B: It can form hydrogen bonding with water.
- C: Its coefficient of solubility is very high.
- D: All of the above.

12. **Which of the following is the weakest intermolecular force?**

- A: Dipole-dipole forces
- B: Ion-dipole forces
- C: Dipole-induced dipole forces
- D: London dispersion forces.

13. **By decreasing pressure the gases become?**

- A: Closer to ideal gas
- B: Closer to non-ideal gas
- C: Pressure has no effect on the ideal behavior of gas.
- D: Depends on the nature of gas.

14. Which of the following substances show anisotropy?

- A: Amorphous solids
- B: Crystalline solids
- C: Liquid crystals
- D: Both B and C

15. Macroscopically plasma is?

- A: Positive
- B: Negative
- C: Neutral
- D: May be positive or negative.

16. Which of the following is true about Ionic solids?

- A: They are the only crystalline solids that can exist as individual crystals.
- B: Intermolecular forces are weak in ionic solids
- C: They are brittle
- D: They are good conductors of electricity

17. Existance of an element in more than one crystalline form is known as?

- A: Polymorphism
- B: Isomorphism
- C: Symmetry
- D: Allotropy

18. Which of the following state of matter is most abundant in the universe?

- A: Solids
- B: Liquids
- C: Gases
- D: Plasma

19. Which solids are generally the hardest one?

- A: Ionic solids
- B: Metallic solids
- C: Molecular solids
- D: Covalent solids

20. Which of the following gases will have the highest rate of diffusion?

- A: N_2
- B: O_2
- C: CO_2
- D: NH_3

TEST 3

1. **Mixture of gas A, B and C are kept at 2 atm. If mole fraction of A is 0.7, B is 0.2 and C is 0.1. What is the partial pressure due to A and B?**

   - A: 0.9 atm
   - B: 1.4 atm
   - C: 1.6 atm
   - D: 1.8 atm

2. **Liquids can be boiled at lower temperature by?**

   - A: Compressing the liquid
   - B: Lowering pressure
   - C: Increasing vaporization pressure
   - D: Liquids have a fixed boiling point that can not be lowered.

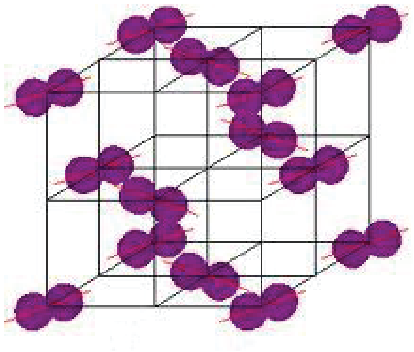
3. **There are four gases H_2, He, N_2 and CO_2 at 0°C. Which gas shows greater non ideal beahviour?**

   - A: He
   - B: CO_2
   - C: H_2
   - D: N_2

4. **By increasing the mass of the gas the slope between V and T of a gas shall?**

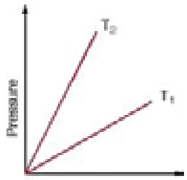
   - A: Increase
   - B: Decrease
   - C: Remain same
   - D: Depends on the type of gas.

5. **The figure below shows the crystalline structure for which of the following?**



   - A: NaCl
   - B: Diamond
   - C: Copper
   - D: Iodine

6. **If the given graph shows two isotherms at temperature T_1 and T_2. The x-axis of graph should be?**



- A: Volume
- B: 1 / Volume
- C: Temperature
- D: Kinetic Energy

7. **What are the number of moles in 13 dm^3 of a gas at 1 atm and 37^o C?**

- A: 0.15 moles
- B: 0.25 moles
- C: 4 moles
- D: None of the above.

8. **Which of the following force is present in both polar and non polar molecules?**

- A: Dipole-dipole forces
- B: Dipole-induced dipoles
- C: London dispersion forces
- D: All of the above.

9. **Molar heat of vapourization for NH_3 is reasonable high because of which of the following factors?**

- A: It is very heavy
- B: It is very dense so occupy less space.
- C: They are polar in nature.
- D: All of the above.

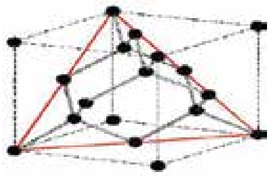
10. **Transition temperature of allotrops as compared to their melting point is?**

- A: Higher
- B: Lower
- C: Same
- D: It may be higher or lower.

11. **Rate of evaporation of petrol is greater than that of water at room temperature because ?**

- A: Petrol molecules experience weaker london forces
- B: Petrol molecules have smaller size
- C: Petrol molecules have no hydrogen bond
- D: All of the above.

12. The figure below is a crystalline structure for which for which of the following solids?



A: NaCl

B: Iodine

C: Copper

D: Diamond

13. Ratio of number of molecules of O_2 and H_2 each with volume 22 dm^3 at STP would be?

A: 1 : 1

B: 2 : 1

C: 16 : 1

D: 32 : 1

14. Ratio between r.m.s. velocity of hydrogen at 50 K and that of oxygen at 800 K is?

A: 4

B: 3

C: 2

D: 1

15. As the size of molecules increase, the london dispersion forces?

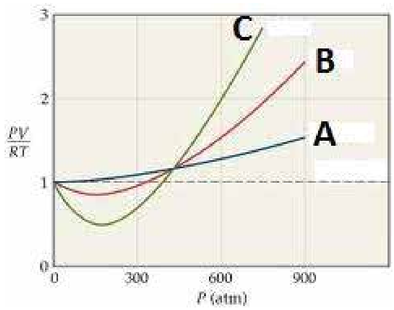
A: Increase

B: Decrease

C: Remain same

D: There is no pattern

16. The figure shows the graph between compressiblity factor and P of a gas at different temperatures. Which curve is most likely to be at highest temperature?



A: A

B: B

C: C

D: Cannot answer with given information.

17. Which of the following properties is anisotropic?

A: Melting point

B: Density

C: Electrical conductivity

D: Geometrical shape

TEST 4

1. Which gas has the highest partial pressure in the atmosphere?

- A: Nitrogen
- B: Oxygen
- C: Carbondioxide
- D: Hydrogen

2. Plasma respond to?

- A: Electric fields
- B: Magnetic fields.
- C: Both electric and magnetic fields.
- D: Neither electric nor magnetic field.

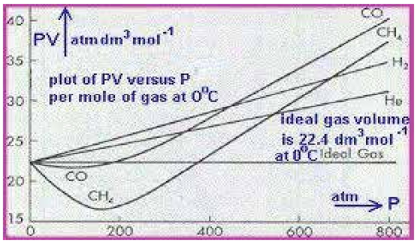
3. At a given temperature and pressure, the one which shows marked deviation from ideal behaviour is?

- A: N_2
- B: H_2
- C: CO_2
- D: He

4. Which type of solids are malleable and ductile?

- A: Ionic Solids
- B: Covalent solids
- C: Metallic solids
- D: Molecular solids

5. Which of the following gas is most ideal at lower pressures?



- A: CO
- B: CH_4
- C: H_2
- D: He

6. Inter molecular forces between a polar molecule and non-polar molecule are called?

- A: Dipole dipole forces
- B: Ion-dipole forces
- C: Dipole-Induced dipole forces
- D: London dispersion forces

7. Carbon exist as allotropes which are different crystalline molecular forms of same substance. Graphite and diamond are allotropes of carbon. Diamond is non-conductor while graphite is a conductor because:

- A: Graphite has layered structure
- B: In Graphite all valence electrons are tetrahedrally bounded
- C: In Graphite one of the valence electron is free to move
- D: Graphite is soft and greasy

8. Some substances are good conductor of electricity in both the solid and liquid states.These substances are generally ?

- A: Ionic substances
- B: Metallic substances
- C: Molecular solids
- D: Covalent network solids

9. The inter-ionic distance in a crystal of KCl is?

- A: 181 pm
- B: 314 pm
- C: 95 pm
- D: 300 pm

10. If dipole-diople forces of X are stronger than Y. Then which of the following is not true?

- A: X has higher melting point than Y
- B: X has higher boiling point than Y
- C: Y has lower heat of vaporization than X
- D: Y has greater heat of sublimation than X

11. Silicon (IV) oxide is an example of which kind of solid?

- A: Ionic
- B: Covalent
- C: Molecular
- D: Metallic

12. Correct order of boiling points of the given liquids is:

- A: H_2O>HF>HCl>NH_3
- B: HF>H_2O>HCl>NH_3
- C: HF>H_2O>NH_3>HCl
- D: H_2O>HF>NH_3>HCl

13. Boyle's law expressed in kinetic theory of gases is?

- A: PV = 1/2 kT
- B: PV = 2/3 kT
- C: PV = 1/3 kT
- D: PV = 3/2 kT

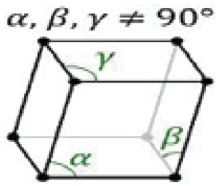
14. Four litres of CO_2 is kept at 27°C. What should be the volume, if the temperature is lowered to 150 K at the same pressure?

- A: 0.5 liter
- B: 2 liter
- C: 4 liter
- D: 5 liter

15. Which of the following expression represents the Avogadro's law?

- A: V=RnT/P (when n and T are constant)
- B: V=RnT/P (when n and P are constant)
- C: V=RnT/P (when P and T are constant)
- D: V=RnT/P (when P, n and T are constant)

16. The crystalline structure given below is?



- A: Monoclinic
- B: Orthorhombic
- C: Triclinic
- D: Tetragonal

17. Cleavage planes is the property of which of the following?

- A: Amorphous solids
- B: Crystalline solids
- C: Plasma
- D: Organic compounds

18. Which of the following sets of crystals*s are most likely to be the isomorphs?

- A: K_2SO_4 & KNO_3
- B: K_2CrO_4 & NaCl
- C: $NaNO_3$ & KNO_3
- D: NaCl and $NaNO_3$

19. 59 °F in Centigrade is equal to?

- A: 5
- B: 9
- C: 11
- D: 15

20. Boiling point of water is higher than petrol because intermolecular forces in water are?

- A: Stronger than petrol
- B: Weaker than petrol
- C: Same as petrol
- D: Negligible

Atomic Structure

TEST 1

1. When n = 3, the values of azimuthal quantum number (l) can be?

- A: +3, -3, +2, -2, +1, -1
- B: -2, -1, 0
- C: +3, +2, +1
- D: 0, +1 ,+2

2. The limiting line of balmer series lies in which region?

- A: Visible
- B: Infrared
- C: Ultra violet
- D: All of these

3. In the ground state of an atom, the electron is present

- A: in the nucleus
- B: in the second shell
- C: nearest to the nucleus
- D: farthest from the nucleus

4. Who concluded through his experiments that cathode rays consist of streams of negatively charged particles?

- A: J. Perrin
- B: E.Goldstein
- C: J.J. Thomson
- D: Rutherford

5. According to bohr's model the energy difference between the first and infinite levels is given as:

$E_{infinity} - E_1 = ?$

- A: 0
- B: Infinity
- C: 1313.31 $kJmol^{-1}$
- D: - 1313.31 $kJmol^{-1}$

6. Which of the following colors has the shortest wavelength and highest frequency in the visible spectrum of light?

- A: Red
- B: Violet
- C: Blue
- D: Indigo

7. ***When a pressure in a discharge tube is reduced, which of the following phenomenon becomes very prominent***

- A: Ionization
- B: Conduction
- C: A discharge is produced
- D: Glow is decreased

8. ***Which of the following colors has the longest wavelength in the visible spectrum of light?***

- A: Blue
- B: Green
- C: Indigo
- D: Red

9. **The wavelength range of visible spectrum is?**

- A: 200–400 nm
- B: 300–400 nm
- C: 350–600 nm
- D: 400–750 nm

10. **For l = 1 the possible magnetic quantum number m value are**

- A: 0, +1
- B: 0, +1, +2
- C: -1, 0, +1
- D: -1, +1

11. **Which quantum number tells about the orientation of orbital's?**

- A: Principle quantum number
- B: Azimuthally quantum number
- C: Spin quantum number
- D: Magnetic quantum number

12. **When an electron drops from a higher energy level to a low energy level then**

- A: energy is emitted
- B: energy is absorbed
- C: atomic number increase
- D: atomic number decrease

13. **The ionization energy of hydrogen atom is:**

- A: Zero
- B: 13.13 kJ/mol
- C: 1313 kJmol
- D: 1313 kJ/mol

14. Which of the following is correct mathematical representation of Mosley's Law?

- A: $\nu = a(Z - b)$
- B: $\nu = b(Z - a)$
- C: $\nu = \sqrt{a(Z - b)}$
- D: $\nu = \sqrt{b(Z - a)}$

15. The volume of space around the nucleus in which there is 95% chance of finding an electron is

- A: Orbit
- B: Degenerate orbital
- C: Atomic orbital
- D: Quantized orbital

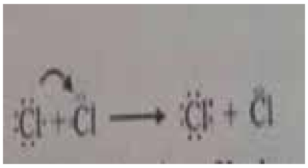
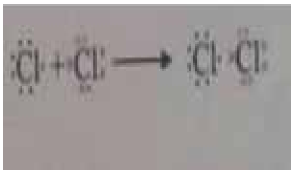
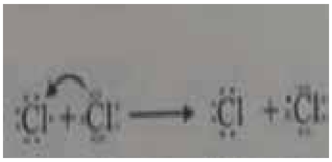
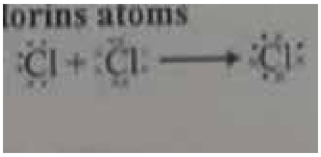
16. Almost the entire mass of an atom is concentrated in the:

- A: Protons
- B: Electrons
- C: Nucleus
- D: Neutrons

17. Which of the following quantum numbers describes energy of an electron in an atom?

- A: Principal
- B: Azimuthally
- C: Magnetic
- D: Spin

18. The suitable representation of cross and dot diagram of Chlorine atoms is?

- A: 
- B: 
- C: 
- D: 

19. The radius of first orbit of hydrogen atom is?

- A: 0.329 A°
- B: 0.429 A°
- C: 0.529 A°
- D: 0.629 A°

20. When passed through an electric field cathode rays are deflected towards which plate?

- A: Positive
- B: Negative
- C: These are not deflected
- D: Deflected in arbitrary direction

TEST 2

1. Cathode rays produce X-rays when they strike a Anode with:

- A: Small atomic mass
- B: Large atomic mass
- C: Any atomic mass
- D: None of these

2. In Rutherford's alpha-scattering experiment, a foil of element that was used?

- A: Silver
- B: Gold
- C: Aluminum
- D: Magnesium

3. Carbon -12 atom has:

- A: 6 electrons, 6 protons, 6 neutrons
- B: 6 electrons, 12 protons, 6 neutrons
- C: 12 electrons, 6 protons, 6 neutrons
- D: 18 electrons, 6 protons, 6 neutrons

4. Which subshell can by occupied by a maximum of 10 electrons?

- A: s-subshell
- B: p-subshell
- C: d-subshell
- D: f-subshell

5. When an electron revolves in a stationary orbit then

- A: It absorbs energy
- B: It emits radiation
- C: It gains kinetic energy
- D: Its energy remains constant

6. Protons and neutrons together make up the atomic nucleus and are called ____________.

- A: Nucleids
- B: Neutral particle
- C: Nuclear Particles
- D: Nucleons

7. Maximum number of electrons in M–shell is ?

- A: 2
- B: 8
- C: 18
- D: 32

8. Which scientist named cathode rays as electrons?

- A: J.J Thomson
- B: Rutherford
- C: E. Goldstein
- D: Stoney

9. Which of the following type of spectrum is characteristic of an atom?

- A: Line spectrum
- B: Atomic spectrum
- C: Continuous spectrum
- D: Both A and B

10. Correct order of energy in the given sub-shells is:

- A: 5s>3d>3p>4s
- B: 5s>3d>4s>3p
- C: 3p>3d>5s>4s
- D: 3p>3d>4s>5s

11. Nitrogen has atomic number 7 and atomic mass 14 i-e $_7N^{14}$. If three beta particles and one alpha particle is emitted then what will be the new atomic number?

- A: 7
- B: 8
- C: 14
- D: 9

12. (n + l) value for 5f orbital will be ?

- A: 5
- B: 6
- C: 7
- D: 8

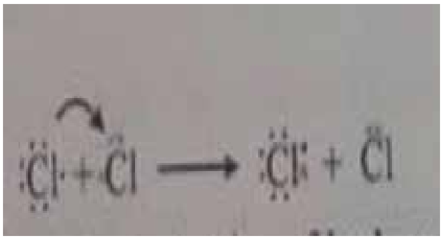
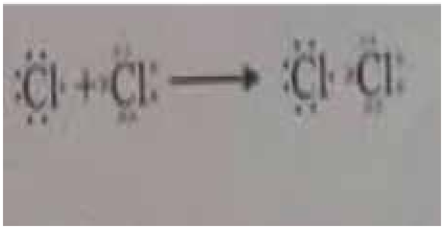
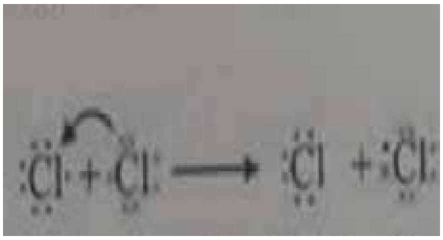
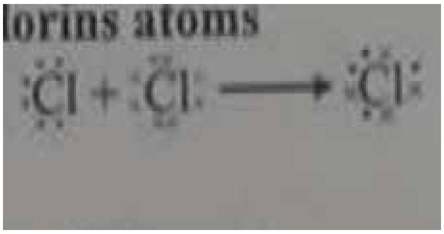
13. Number of electrons in the outermost shell of chloride ion (Cl^-) is:

- A: 17
- B: 7
- C: 1
- D: 8

14. The probability of finding an electron is zero between two orbitals. This place is called ___________?

- A: Shell
- B: Node
- C: Nodal surface
- D: Energy level

15. Which one of the following is the correct cross and dot diagram of chlorine atoms?

- A: 
- B: 
- C: 
- D: 

16. Alpha particles are identical to?

- A: hydrogen atoms
- B: helium atoms
- C: fast moving electrons
- D: fast moving neutrons.

17. According to Goudsmit and Uhlenbech suggestion the spinning electron is associated with:

- A: Electric field
- B: Magnetic field
- C: Both Electric and Magnetic field
- D: Heating effect

18. The e/m value of cathode rays show that these rays are simply:

- A: Protons
- B: Electrons
- C: Neutrons
- D: Canal rays

19. The relative energies of 4s,4p and 3d orbitals are in the order:

- A: 4s<3d<4p
- B: 3d<4p<4s
- C: 4p<4s<3d
- D: 4p<3d<4s

20. The nature of positive rays depend on

- A: The nature of electrode
- B: The nature of gas taken in the discharge tube.
- C: The nature of residual gas
- D: All of above

TEST 3

1. **Which of the following relation is correct for Planck's Equation ?**

   A: E=mc
   B: E=hc
   C: E= hc / λ
   D: $E= mc^2$

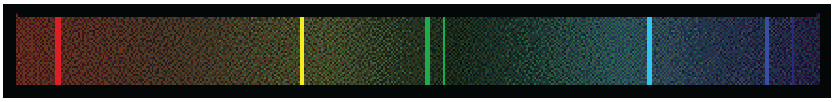
2. **The series limit for the balmer series of hydrogen spectrum occurs at 3664 A. calculate ionization energy of hydrogen atom**

   A: $21.7 \times 10^{-19} J$
   B: $6.626 \times 10^{-34} J$
   C: $5.425 \times 10^{-19} J$
   D: $3664 \times 10^{-10} J$

3. **In an atom, the electrons**

   A: **revolve around the nucleus at random**
   B: are distributed in three dimensional charge cloud around the nucleus
   C: embedded in space around the nucleus
   D: are stationary in various energy levels

4. **What kind of spectrum is shown in the figure below,**



   A: Continuous Spectrum
   B: Emission Spectrum
   C: Absorption Spectrum
   D: None of these.

5. **What is the radius of 3rd orbit as compared to the first orbit given by Bohr?**

   A: 4 times
   B: 9 times
   C: 16 times
   D: 27 times

6. **The/m value of electron is 1.7586 $\times 10^{11}$ Columbs kg^{-1} . What would be the mass of electron?**

   A: 9.1095×10^{-31}kg
   B: 9.1095×10^{-30}kg
   C: 9.95×10^{-11}kg
   D: 9.1095×10^{-33} kg

7. How many quantum numbers have been derived from Schrodinger wave equation, when it is solved for H-atom?

- A: Two
- B: Three
- C: Four
- D: One

8. According to Goudsmit and Uhlenbech suggestion the spin motion of electrons is resposible for which structutre?

- A: Triplet
- B: Pentavalent
- C: Circular
- D: Doublet line structure

9. The spectral lines of Balmer series (visible region) are produced when electron jumps from higher orbit to ?

- A: 1st orbit
- B: 2nd orbit
- C: 3rd orbit
- D: 4th orbit

10. All the lines of Pashen series, Brackett series and Pfund series fall in which region of electromagnetic spectrum?

- A: U.V region
- B: Visible region
- C: Cosmic region
- D: Infrared region

11. The wave number of the light emitted by a certain source is 2 x 10^6 m. The wavelength of this light is

- A: **500 nm**
- ***B: 500 m***
- C: 200 nm
- D: 5 x 10^{-1} m

12. Nitrogen has three unpaired electrons because of:

- A: Pauli's exclusion principal
- B: Aufbau principal
- C: Uncertainly principal
- D: Hunds rule

13. If a stone of 1 gm is moving with a velocity of 10 m/s then its wavelength will be:

- A: 6.65 x 10^{-30} m
- B: 6.65 x 10^{-25} m
- C: 6.65 x 10^{-28} m
- D: 6.626 x 10^{-32} m

14. Which type of atomic spectrum is given in the following diagram?

- A: Atomic Emission spectrum
- B: Atomic absorption spectrum
- C: Continuous spectrum
- D: None of these

15. Which principle explains that two electrons in the same orbital should have opposite spin?

- A: Aufbau Principle
- B: Heinsenburg Principle
- C: Pauli's Exclusion Principle
- D: Hund's rule

16. Which type of spectrum is given by elements?

- A: Continuous
- B: Line
- C: Bond
- D: None of these

17. According to valence shell electron pair repulsion theory, the repulsive forces between the electron pairs of central atom of a molecule are in the order:

- A: Lone pair-Bond pair>Lone pair-Lone pair>Bond pair-Bond pair
- B: Lone pair-Bond pair>Bond pair Bond pair>Lone pair-Lone pair
- C: Bond pair-Bond pair>Lone pair-Lone pair>Lone pair-Bond pair
- D: Lone pair-Lone pair>Lone pair-Bond pair>Bond pair-Bond pair

18. Which of the following statements does not form part of Bohr's model of the hydrogen atom:

- A: Energy of the electrons in the orbit is quantized.
- B: Electrons revolve in different orbits around the nucleus.
- C: The electron in the orbit nearest the nucleus has the lowest energy.
- D: The position and velocity of the electrons in the orbit cannot be determined simultaneously.

TEST 4

1. **The spectral lines of Lyman series (uv region) are produced when electron jumps from higher orbit to:**

- A: 1st orbit
- B: 2nd orbit
- C: 3rd orbit
- D: 4th orbit

2. ***When the 5d orbital is complete the entering electron goes into:***

- A: 6f
- B: 7s
- C: 4f
- D: 6p

3. **The mass number of an element is equal to:**

- A: number of electrons in an atom
- B: number of protons and neutrons in the nucleus
- C: number of protons in the nucleus
- D: Number of neutrons in the Nucleus

4. **The velocity of photon is:**

- A: Independent of its wavelength
- B: Depends on its wavelength
- C: Equal to square of its amplitude
- D: Depends on its source

5. **Goldstein discovered that besides the cathode rays, another type of rays are produced in the discharge tube which are called?**

- A: alpha rays
- B: beta rays
- C: positive rays
- D: gamma rays

6. **With increase in value of principle quantum number 'n', the shape of 's' orbital remains same although their sizes:**

- A: Increase
- B: Decrease
- C: Remain same
- D: May or may not remain same

7. The value of azimuthal quantum number always start from:

- A: 1
- B: 2
- C: 3
- D: zero

8. Ultraviolet, X-rays, γ- rays and cosmic rays lie towards the ______________ end of the spectrum.

- A: Higher wavelength
- B: Lower Frequency
- C: Lower wavelength
- D: In the visible region.

9. Among the following electrons, which has highest energy?

- A: N= 3, l = 2, m = 0, s = +1/2
- B: N= 4, l = 0, m = 0, s= +1/2
- C: N= 3, l = 1, m = 1, s = −1/2
- D: N= 3, l= 0, m = 0, s= −1/2

10. The colour of the glow produced when cathode rays strike the walls of the glass tube:

- A: Depends upon the no. of electrons
- B: Depends upon the composition of glass
- C: Independent of the composition of glass
- D: Glow is not produced

11. The nature of cathode rays in the discharge tube:

- A: Depends upon the nature of gas used in the discharge tube.
- B: Depends upon the nature of anode used in the discharge tube.
- C: Is independent of the nature of gas used in the discharge tube.
- D: Depends upon the nature of cathode used in the discharge tube.

12. A beryllium atom has 4 protons, 5 neutrons, and 4 electrons. What is the mass number of this atom?

- A: 4
- B: 5
- C: 9
- D: 13

13. The calculated e/m value of electron is ?

- A: 1.602×10^{19} C kg^{-1}
- B: 1.7588×10^{-11} C kg^{-1}
- C: 1.7588×10^{11}C kg^{-1}
- D: 1.759 x 109 c kg

14. Cathode rays can drive a small paddle wheel which shows that they?

- A: are positively charged
- B: possess momentum
- C: do not possess momentum
- D: none of these

15. Which theory regards atoms as ultimate particles which cannot be divided any further?

- A: Bohr's theory
- B: Berzellius's theory
- C: Dalton's theory
- D: Simon's theory

16. Which rays are emitted when a slow moving neutrons hits the $_{29}Cu^{66}$ metal?

- A: α-radiations
- B: β-radiations
- C: γ-radiations
- D: All of these

17. Bohr's model of atom is contradicted by:

- A: Planck's quantum theory
- B: pauli Exclusion Principle
- C: Heisenberg uncertainty principle
- D: All of the above

18. The atomic number of an element is 17. The number of orbits is?

- A: 1
- B: 2
- C: 3
- D: 4

19. In how many ways an atomic spectrum can be viewed?

- A: One
- B: Two
- C: Three
- D: Four

20. The charge on electron was determined by?

- A: J.J. Thomson
- B: Millikan
- C: Rutherford
- D: Bohr

Chemical Bonding

TEST 1

1. **Coordinate covalent bonding takes place between NH_3 and BF_3 and a complex is produced. The nature of the charge on complex is:**

- A: Anionic
- B: Cationic
- C: Neutral
- D: None of these

2. **Hybrid orbital's have same:**

- A: Shape
- B: Energy
- C: Both shape and energies
- D: None of these

3. **What is the bond order in helium?**

- A: Zero
- B: 1
- C: 2
- D: 3

4. **Which bond is formed when a shared pair of electrons is donated by one of the bonded atoms?**

- A: Ionic Bond
- B: Covalent Bond
- C: Coordinate Covalent Bond
- D: Hydrogen Bond

5. **The system of two hydrogen atoms is stabilized to maximum extent, when they approach to a distance of ________?**

- A: Maximum energy
- B: Minimum energy
- C: Intermediate energy
- D: Activation energy

6. **Atomic radius can be determined by:**

- A: X-ray diffraction
- B: Spectroscopy technique
- C: Microscope
- D: Both A and B

7. Crystal Field Theory explains the formation of _______________ compounds formed by transition metals.

- A: Covalent compounds
- B: Non-covalent compounds
- C: Ionic compounds
- D: Coordination complex compounds

8. Which of the statement given below is correct about the reactivity of covalent and ionic compounds:

- A: Reactivity of covalent compounds $>$ ionic compound
- B: Reactivity of covalent compounds $<$ ionic compounds
- C: Reactivity of covalent compounds $=$ ionic compound
- D: None of these

9. The element with the highest electro negativity value is :

- A: Oxygen
- B: Carbon
- C: Nitrogen
- D: Flourine

10. Which of the following group of elements is the most stable group of all the elements:

- A: Halogens
- B: Alkali metals
- C: Alkaline earth metals
- D: Noble gases

11. How many bond pairs and lone pairs respectively are there in NH_3 molecule according to VSEPR theory:

- A: 2 Bond and 1 lone pair
- B: 1 Bond and 2 lone pairs
- C: 3 Bond and 1 lone pair
- D: 3 Bond and 2 lone pairs

12. The tendency of atoms to attain a maximum of eight electrons in the valence shell is known as:

- A: Hund's rule
- B: Octet rule
- C: Duplet rule
- D: Aufbau's rule

13. Which of the following pair has same trend in the periodic table?

- A: Atomic radius and Ionization energy
- B: Electro negativity and Ionization energy
- C: Atomic radius and Electro negativity
- D: Atomic radius and Electron affinity

14. The process in which the orbital's of different energies and shape mix with each other to give equivalent hybrid orbital's is called:

- A: Dissolution
- B: Hybridization
- C: Resonance
- D: Ionization

15. According to modern theory of chemical bonding bond formation between to H-atoms leads to _______ in energy.

- A: Increase
- B: Decrease
- C: It may increase or decrease
- D: Energy always remains constant

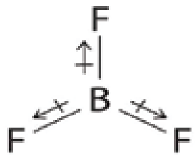
16. The bond angle in SO_4^{-2} is___________?

- A: 104°
- B: 107.5°
- C: 109.5°
- D: 102°

17. The electro negativity of H-atom is 2.1 and that of F-atom is 4 according to Pauling Scale. What kind of bonding is present in HF?

- A: Non-polar covalent bond
- B: Polar covalent bond
- C: Coordinate Covalent bond
- D: Ionic bond

18. What will be the dipole moment for :



- A: zero
- B: 1
- C: 2
- D: 3

19. The bond order of nitrogen is:

- A: zero
- B: 1
- C: 2
- D: 3

20. Which of the following is not true about covalent compounds?

- A: Directional nature
- B: Non-directional nature
- C: Soluble in benzene
- D: Slow reactions

TEST 2

1. $BeCl_2$ has _____________ geometry.

- A: Linear
- B: Tetrahedral
- C: Triangular pyramidal
- D: Bent

2. Electron affinity of an anion is always given _____________ charge?

- A: Positive
- B: Negative
- C: Both
- D: None of these

3. Which method is used to determine the energies of molecular orbitals?

- A: Filtration method
- B: Spectroscopic measurement
- C: X-ray technique
- D: Liquification

4. The paramagnetic character of a substance is due to the presence of:

- A: Bond pairs of electrons
- B: Lone pairs of electrons
- C: Unpaired electrons in an atom or molecule
- D: Paired electrons in valence shell of atom

5. Benzene has how many number of bonds :

- A: Six σ and six π
- B: Six σ and twelve π
- C: Twelve σ and twelve π
- D: Twelve σ and six π

6. The general trend for atomic radius is that it _________ in a period on moving from left to right.

- A: Decreases
- B: Increases
- C: Remains constant
- D: Fiirst increases then decreases.

7. Ionic compoLuds are obtained by the combination of groups:

- A: 3 and 5
- B: 2 and 5
- C: 1 and 7
- D: 4 and 8

8. **All the molecules having a linear structure have a dipole moment __________________?**

- A: 1
- B: 2
- C: 3
- D: zero

9. **Bond energy can also be regarded as:**

- A: Bond enthalpy
- B: Bond diffusing energy
- C: Bond breaking energy
- D: All of these

10. **Which is the unit to measure Dipole moment:**

- A: Dell
- B: Meter
- C: Kilogram
- D: Debye

11. **Tetrahedral molecules have a dipole moment ____________ ?**

- A: zero
- B: 1
- C: 2
- D: 3

12. **The general trend for bond length in periodic table is that it ______________ in a period in moving from left to right.**

- A: Increases
- B: Decreases
- C: It may increase or decrease
- D: No trend

13. **F-atom after gaining one electron forms a flouride (F^{--}) ion by obeying octet rule and thus attains the electronic configuration of nearest noble gas. Flouride (F^{--}) ion has electonic configuration similar to which one of the following noble gas:**

- A: He
- B: Ar
- C: Ne
- D: Kr

14. **All the molecules having a linear structure have a dipole moment __________________?**

- A: 1
- B: 2
- C: 3
- D: zero

15. According to a postulate of VSEPR theory electron pairs are arranged around the central polyvalent atom so as to remain at a ____________ distance?

- A: Maximum
- B: Minimum
- C: Intermediate
- D: None of these

16. Ionic radius of an anion is always ________ than the parent atom.

- A: Larger
- B: Smaller
- C: Remains same
- D: Extremely small

17. The dipole moment for water is ____________?

- A: 15.7D
- B: 1.61D
- C: 1.85D
- D: 0.95D

18. The bond formed by sideways approach of p-orbitals is called?

- A: Sigma (σ) bond
- B: Pie (π) bond
- C: Hydrogen bond
- D: Both Sigma (σ) and Pie (π) bond

19. According to a postulate of VSEPR theory which of the following participates in determining the geometry of the molecules?

- A: Lone pair
- B: Bond pair
- C: Both Lone and Bond pairs
- D: Free electrons

20. What is the unit used for Electronegativity?

- A: picometer (pm)
- B: nanometer (nm)
- C: kg
- D: No unit

TEST 3

1. Carbon in the form of graphite is a non-conductor in which direction?

- A: Perpendicular to the layers
- B: Parallel to layers
- C: Graphite is conductor in all directions
- D: All above statements are correct.

2. Which of the following will be used, If ethnic acid is to be prepared by the hydrolysis of alkyl nitrides?

- A: CH_3CH_2CN
- B: $CH_3CH_2CH_2CN$
- C: CH_3CN
- D: HCN

3. The bond angle in H_2S is __________?

- A: 109.5°
- B: 107.5°
- C: 92°
- D: 102°

4. The observed dipole moment of HF is 1.90D. If the ionic dipole moment (μ_{ionic}) is 1.469 x 10^{-29}mC. what will be the %age ionic character?

- A: 40%
- B: 72%
- C: 43.2%
- D: 92%

5. The elements having intermediate values of ionization energy are mostly ___________ in nature.

- A: Metals
- B: Non-metals
- C: Metalloids
- D: Highly reactive

6. The ions produced when alcohols offer their lone pairs to H^+ to form coordinate covalent bond are called:

- A: Oxalate ions
- B: Alcoholic ions
- C: Oxonium ions
- D: Phosporate ion

7. The filling of electrons in molecular orbital's takes place according to which phenomenon?

- A: Aufbau's principle
- B: Hund's rule
- C: Pauli exclusion principle
- D: All of these

8. How many electrons does a Chloride ion (Cl^-) have in its outermost shell?

- A: 7
- B: 2
- C: 8
- D: 5

9. If the 2nd ionization energy of an element is 1200 and the 3rd ionization energy of the same element is 5000. What ill be the valency of this element.

- A: 1
- B: 2
- C: 3
- D: 4

10. Which one of the following has a different arrangement of pairs :

- A: H_2O
- B: CH_4
- C: NH_3
- D: BF_3

11. Liquid O_2 is attracted towards magnet due to which of the following property?

- A: Paramagnetic
- B: Diamagnetic
- C: Oxidative
- D: Reductive

12. The bond angle in NF_3 is:

- A: 109^o
- B: 107^o
- C: 102^o
- D: 104^o

13. How much ionic character does CsF has?

- A: 72%
- B: 94%
- C: 92%
- D: 90%

14. VSEPR theory, which explains the shapes of molecules for non-transition elements was developed by:

- A: Sidwick and Powell
- B: Nylholm and Gillespie
- C: Lewis and Arrhenius
- D: C.M. Guldberg and P .Waage

15. The ionization energies of which of the following groups show abnormal trend.

- A: I-A
- B: VI-A
- C: VIII-A
- D: VII-A

16. Oxyacids of Chlorine e.g ($HClO_4$, $HClO_3$, $HClO_2$) have coordinate covalent bond between which two atoms?

- A: Hydrogen and Chlorine
- B: Hydrogen and Oxygen
- C: Oxygen and Chlorine
- D: All of these

17. In a CH4 molecule, the nature of each C-H bond is:

- A: Highly polar covalent
- B: Slightly polar covalent
- C: Non-polar covalent
- D: Ionic bond

18. The equivalence of Debye and mC is that 1 Debye(D) is equal to ______________?

- A: 6.022×10^{27}Mc
- B: 3.336×10^{30}mC
- C: 3.336×10^{-30}mC
- D: 3.66×10^{27}mC

19. The ionization energy is the ____________measure of stability of an isolated atom.

- A: Quantitative
- B: Qualitative
- C: Physical
- D: Chemical

20. Formula to calculate percentage ionic character using dipole moment is;

%age ionic character = _________________

- A: $\mu_{obs} \times \mu_{ionic}$
- B: $\mu_{obs} \div \mu_{ionic}$
- C: $(\mu_{obs} \times \mu_{ionic}) \times 100$
- D: $(\mu_{obs} \div \mu_{ionic}) \times 100$

TEST 4

1. What will be the effect of s-character on bond length?

- A: Greater the s-charcter longer will be the bond length
- B: Greater the s-charcter shorter will be the bond length
- C: Smaller the s-charcter smaller will be bond length
- D: None of these

2. Elements attaining the electronic configuration of Helium (He) follow which rule:

- A: Octet rule
- B: Duplet rule
- C: Aufbau's rule
- D: Hund's rule

3. Which of the following molecules does not obey octet rule:

- A: NaH
- B: BF_4
- C: SF_6
- D: LiH

4. Tetrahedral structure has how many bond angles?

- A: 3
- B: 4
- C: 5
- D: 6

5. In H-F bond electro negativity difference is '1.9'. What type of bond is this?

- A: Non-polar covalent bond
- B: Polar covalent bond
- C: Pi bond
- D: Co-ordinate covalent bond

6. The number of bonds in Nitrogen molecule is?

- A: One σ and one π
- B: One σ and two π
- C: Three σ
- D: Two σ and one π

7. The ionic radius of a caution is always ___________ than the atomic radius of the element from which it is derived.

- A: Larger
- B: Smaller
- C: Remains same
- D: Extremely large

8. Which of the following has highest bond energy?

- A: C—O
- B: C=O
- C: C ≡ O
- D: All have same bond energy.

9. The tendency of an atom to attract shared pair of electrons to itself is called:

- A: Ionization energy
- B: Electron affinity
- C: Electro negativity
- D: Hydrogen Bonding

10. How many electrons are shared in a double bond :

- A: 1
- B: 2
- C: 3
- D: 4

11. Which type of information about the molecular structure is not provided by Dipole moment:

- A: percentage ionic character
- B: Angles between the bonds
- C: Hydration energy
- D: Geometry of the molecules

12. The angle between unhybridized p-orbital's and three sp^2hybridized orbital's of each carbon atom in ethene is:

- A: 90^o
- B: 120^o
- C: 109.5^o
- D: 180^o

13. In sp^3 hybridization, the %age participation of s orbital is:

- A: 100%
- B: 75%
- C: 50%
- D: 25%

14. Which one of the following hydrogen bonds is stronger than the others?

- A: $N^{\delta-} - H^{\delta+} - - - - - - - - - - - - N^{\delta-} - H^{\delta+}$
- B: $F^{\delta-} - H^{\delta+} - - - - - - - - - - - - - - - - F^{\delta-} - H^{\delta+}$
- C: $O^{\delta-} - H^{\delta+} - - - - - - - - - - - - - - O^{\delta-} - H^{\delta+}$
- D: $N^{\delta-} - H^{\delta+} - - - - - - - - - O^{\delta-} - H^{\delta+}$

15. The dipole moment between the two bonded atoms is always directed from:

- A: electronegative to electropositive end
- B: electropositive to electronegative end
- C: Arbitrary direction
- D: It is a scalar quantity and has no direction

16. Water has which type of molecular geometry?

- A: Linear
- B: Tetrahedral
- C: Trigonal planar
- D: Bent or Angular

17. What will be the nature of covalent bond when two different atoms are joined through this bond?

- A: Polar
- B: Non-Polar
- C: Ionic
- D: Non-polar double bond

18. In which type of bond the electron density is maximum around the line joining the two nuclei?

- A: Sigma (σ) bond
- B: Pie (π) bond
- C: Hydrogen bond
- D: Both Sigma (σ) bond and Pie (π) bond

19. How many corners are there in a tetrahedral geometry?

- A: 3
- B: 4
- C: 5
- D: 6

20. When the two partially filled atomic orbitals overlap in such a way that the probability of finding the electron is max around the joining of the two nuclei, the result is the formation of?

- A: Metallic bond
- B: Pi- Bond
- C: Hydrogen bond
- D: Sigma Bond

Thermochemistry

TEST 1

1. The total of all possible types of energies in a chemical system is called?

- A: Kinetic energy.
- B: Potential energy.
- C: Internal energy.
- D: Heat energy.

2. A mixture of ice and water contains 60g of ice and 60g of water. If 60J of heat energy is removed from this mixture then some of the?

- A: Water will freeze
- B: Water will vaporize
- C: Ice will melt
- D: Ice will sublime

3. Suppose you have a baloon of given volume, V_1, containing a gas at temperature, T_1. When you place the baloon in a colder room at temperature, T_2, the baloon's temperature starts to drop. What are the signs of the system's Q and W for this process ?

- A: +Q,+W
- B: -Q,-W
- C: +Q,-W
- D: -Q,+W

4. Temperature of the system increases above the surroundings in which of the following reactions?

- A: Exothermic.
- B: Endothermic.
- C: Both A and B.
- D: Neither A nor B.

5. If volume of a system is kept constant and heat is supplied to the system then?

- A: Internal energy of the system increases and no work is done on the surrounding
- B: Internal energy of the system increases and work is done on the surrounding
- C: No change in internal energy occurs
- D: No work is done on the surrounding

6. Spontaneous reactions are those which?

- A: Continue to occur once started.
- B: Require activation energy.
- C: Are endothermic.
- D: Are exothermic.

7. The branch of chemistry that deals with the heat changes accompanying the chemical reactions is called?

- A: Electro chemistry.
- B: Chemical kinetics.
- C: Organic chemistry.
- D: Thermo chemistry.

8. In which of the following reactions, maximum increase in the entropy is observed?

- A: Mixing of salt in water.
- B: Melting of ice.
- C: Sublimation of a salt.
- D: Water condensation.

9. All of the following are state functions except ?

- A: P
- B: V
- C: Q
- D: H

10. Unit of entropy is?

- A: JK^{-1}
- B: $J\ mol^{-1}$
- C: $J^{-1}\ K^{-1}\ mol^{-1}$
- D: $JK\ mol^{-1}$

11. What are the standard conditions to measure the enthalpy of a reaction?

- A: 25 K & 1 atm
- B: 25 K, 1 atm and all reactants and products in standard form.
- C: 298 K & 1 atm
- D: 298 K, 1 atm and all reactants and products in standard form.

12. Which of the following statement is true?

- A: Bond breaking release energy and bond making absorb energy.
- B: Bond breaking absorbs energy and bond making release energy.
- C: Both bond making and bond breaking release energy.
- D: Both bond making and bond breaking absorb energy.

13. All of the following statements are false except ?

- A: $q = \Delta H$ at constant T; $q = \Delta E$ at constant V
- B: $q = \Delta H$ at constant V ; $q = \Delta E$ at constant P
- C: $q = \Delta H$ at constant P; $q = \Delta E$ at constant V
- D: $q = \Delta H = \Delta E$ at constant P or at constant V

14. As per Hess's Law $\Sigma\Delta H$ of a cycle is?

- A: Positive
- B: Negative
- C: One
- D: Zero

TEST 2

1. Internal energy of a system can be changed through?

- A: Heat
- B: Work
- C: Both A and B
- D: None of the above.

2. ΔH is positive in which of the following reactions?

- A: Endothermic.
- B: Exothermic.
- C: Isothermic.
- D: All of the above.

3. Heat of formation of one mole of liquid water from its ionic components is called?

- A: Enthalpy of hydration.
- B: Enthalpy of formation.
- C: Enthalpy of neutralization.
- D: Enthalpy of solution.

4. Which of the following equation would give the enthalpy of combustion? (assume standard form of the reactants and products)

- A: $CH_4 + 2\ O_2$ -------------> $CO_2 + 2\ H_2O$ ΔH = -A
- B: $C + O_2$ ----------> CO_2 ΔH = -B
- C: $C_2H_5OH + 3O_2$ -------------> $2CO_2 + 3H_2O$ ΔH = -C
- D: All of the above.

5. A reaction from X ---> Y has enthalpy change of 10 KJ. If this reaction is broken down into three step then the total change in enthalpy would change to?

- A: Remain same
- B: 15 KJ
- C: 30 KJ
- D: - 10 KJ

6. Heat of reaction at a constant pressure is called?

- A: Change in internal energy.
- B: Change in kinetic energy.
- C: Change in potential energy.
- D: Change in enthalpy.

7. Melting of ice at room temperature is ?

- A: Spontaneous exothermic process.
- B: Spontaneous endothermic process.
- C: Non-spontaneous exothermic process.
- D: Non-spontaneous endothermic process.

8. Change in enthalpy ΔH = ?

- A: q_v
- B: q_p
- C: $q_v - q_p$
- D: $q_v + q_p$

9. ΔH will be given a negative sign in?

- A: Decomposition reactions
- B: Exothermic reactions
- C: Dissociation reactions
- D: Endothermic reactions

10. Which of the following is a state function?

i. Enthalpy, ii. Heat, iii. Work

- A: i only
- B: i and ii only
- C: ii and iii only
- D: i and iii only

11. Which one of the following is not included in internal energy?

- A: Vibrational energy
- B: Energy arising out of collision forces
- C: Electronic energy
- D: Energy arising out of gravitational pull

12. **During the manufacturing of nitric acid, nitric oxide is oxidized to nitrogen oxide. This reaction is given as :**

$2NO + O_2 \Longrightarrow 2NO_2 \qquad \Delta H = -114 kJ/mol$

According to Le Chatellier's principle :

- A: Reaction must be carried out at room temperature
- B: Reaction must be carried out at low temperature
- C: Reaction must be carried out at high temperature
- D: Reaction must not be temperature dependant

13. Which of the following is an exothermic reaction?

- A: $2H_2O$ -------------> $H_2 + O_2$ $\Delta H = +285$ kJ/mol
- B: $N_2 + O_2$ -----------> 2NO $\Delta H = +180$ kJ/mol
- C: $N_2 + H_2$ -----------> $2NH_3$ $\Delta H = -41$ kJ/mol
- D: All of the above.

14. The equation that represents the standard enthalpy of atomization of hydrogen is :

- A: 1/2 H_2O (L) ---------> H_2 (g)+ 1/2O_2 (g)   +218kJmol^{-1}
- B: 1/2 H_2 (g) ---------> H (g)   +218kJmol^{-1}
- C: 1/2 H_2O (L) ---------> H_2 (g) + 1/2O_2 (g)   -218kJmol^{-1}
- D: 1/2 H_2 (g) ---------> H (g)   -218kJmol^{-1}

15. Which of the following state function is impossible to measure in a given state?

- A: Pressure
- B: Volume
- C: Enthalpy
- D: All of them can be measured in a given state.

16. Which of the following is a limiting case between the spontaneous and non-spontaneous process?

- A: Endothermic process.
- B: Exothermic process.
- C: Irreversible process.
- D: Reversible process.

17. Which of the following is true for the exothermic reactions?

- A: Enthalpy of the products is more than that of the reactants.
- B: Enthalpy of the products is less than that of the reactants.
- C: Enthalpy of the products is equal to that of the reactants.
- D: Enthaply of reactants or products has no relation with the reaction being exothermic or endothermic.

18. **Comustion of graphite to form CO_2. can be done by two ways. Reactions are given as follows**

$C + O_2$ --------------> CO_2 $\Delta H =$ -393.7 KJ/mol

$C + O$ ---------------> CO $\Delta H_1 =$?

$C + 1/2O_2$ -----------------> CO_2 $\Delta H_2 =$ -283 KJ/mol

What will be enthalpy of formation of CO?

- A: -676 KJ/mol
- B: 110 KJ/mol
- C: -110 KJ/mol
- D: 676 KJ/mol

19. Sublimation, vaporization, melting and photosynthesis all are examples of ?

- A: Spontaneous processes
- B: Physical processes
- C: Exothermic processes
- D: Endothermic processes

20. Enthalpy of neutralization for any strong acid with a strong base is equal to?

- A: -57.4 KJ/Mol
- B: 57.4 KJ/Mol
- C: -574 KJ/Mol
- D: 574 KJ/Mol

TEST 3

1. **If ΔE of a system = q. What can you conclude about the system?**

- A: The system is isothermic.
- B: The system is adiabatic.
- C: The system has constant volume.
- D: The system is a gas system.

2. **The enthalpies of combustion of carbon and carbon monoxide are - 393.5 and - 283 kJ mol^{-1} respectively. The enthalpy of formation of carbon monoxide per mole is?**

- A: -110.5 KJ
- B: +110.5 KJ
- C: -676.5 KJ
- D: + 676.5 KJ

3. **2 moles of helium gas are expanded isothermally and irreversibly at 270C from volume 1 dm^3 to 1 m^3 at a constant pressure of 100 kPa. Calculate the work done?**

- A: 99900 KJ
- B: 99900 J
- C: 34464 KJ
- D: 34464 J

4. **Heat of formation, ΔH^o_f of an explosive compound like NCl_3 is?**

- A: Positive
- B: Negative
- C: Zero
- D: Cannot answer from the given information.

5. **If $C_6H_6(I) + 15/2\ O_2\ (g) \text{--->} 3H_2O(I) + 6CO_2\ (g)$; $\Delta H = -3264.6 kJ\ mol^{-1}$, then the energy obtained by burning 4 g of benzene in air is ?**

- A: 115 KJ
- B: 167 KJ
- C: 183 KJ
- D: 198 KJ

6. **If ΔE of a system = q. Work done by the system is?**

- A: Zero
- B: Positive
- C: Negative
- D: Undefined

7. **Consider the following hypothetical reaction:**

$$A_2(g) + 3B_2(g) \text{--->} 2AB_3(g)$$

If the enthalpy change for the reaction is – 90 kJ, what will be the enthalpy of formation of $AB_3(g)$?

- A: – 90 Kj
- B: – 180 kJ
- C: – 45 kJ
- D: – 30 kJ

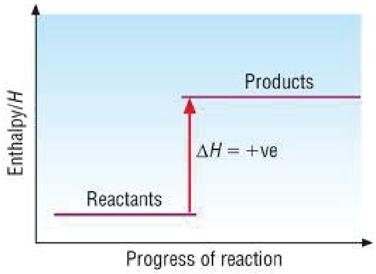
8. **A balloon is heated by supplying 600J of heat. The balloon expands doing 200J of work against the atmospheric pressure. The change in internal energy of ?**

- A: - 800 J
- B: - 400 J
- C: 0 J
- D: + 400 J

9. **Which of the following reaction would give the enthalpy of atomization?**

- A: $H_2 + 1/2O_2$ ---------> H_2O ΔH = -A
- B: O + O ---------> O_2 ΔH = -B
- C: $1/2H_2$ -------------> H ΔH = -C
- D: $H^+ + OH^-$ ----------------> H_2O ΔH = -D

10. **The figure below shows what kind of reaction?**



- A: Isothermic
- B: Exothermic
- C: Endothermic
- D: Any of the above.

11. **In a glass calorimeter, mass of the reactants is 100 g, specific heat of the solution is 4 JK-1g-1. Mixing of 0.1 mole of an acid and base in the solution increases the temperature from STP temperature to 30º C. What is the heat evolved in this reaction?**

- A: -2 KJ
- B: - 20 KJ
- C: - 10 KJ
- D: - 100 KJ

12. **In order to check the spontaneity of a reaction which of the following is studied?**

- A: Heat exchange.
- B: Enthalpy.
- C: Reaction kinetics.
- D: Free energy.

13. **In a glass calorimeter, mass of the reactants is 100 g, specific heat of the solution is 4 $JK^{-1}g^{-1}$. Mixing of 0.1 mole of an acid and base in the solution increases the temperature from STP temperature to 30º C. What is the enthalpy of neutralization?**

- A: - 2 KJ
- B: - 10 KJ
- C: - 20 KJ
- D: - 100 KJ

$2H_2 + O_2 \rightarrow 2H_2O$

14. If H_f is the heat of formation of H_2O and H_r is the heat of this reaction, then ?

- A: $H_f = H_r$
- B: $H_f = H_r / 2$
- C: $H_r = H_f / 2$
- D: None of the above.

15. Which of the following is a spontaneous process?

- A: $N_2 + O_2$ -------------> NO
- B: $H_2 + O_2$ ---------------> H_2O
- C: NaOH + HCl ---------------> NaCl + H_2O
- D: All of the above.

16. Which of the following statement is correct?

- A: Total energy of the products in endothermic reaction is equal to that of the reactants.
- B: Total energy of the products in exothermic reaction is equal to that of the reactants.
- C: Total energy of the products is always equal to that of the reactants.
- D: Total energy of the products is never equal to that of the reactants.

17. Which of the following is an example of spontaneous process?
i. Burning of coal, ii. Neutralization of acid-base, iii. Evaporation

- A: ii only.
- B: iii only
- C: ii and iii only
- D: i, ii and iii only.

18. Consider the reaction: $2C + O_2$ ---> $2CO_2$. $\Delta H = -395.5$ kJ/mol. Which of the following statements is/are correct for this reaction?

- A: The reaction gives the heat of formation.
- B: The reaction in exothermic.
- C: Reaction needs no initiation.
- D: All of the above.

19. Which of the following pairs has the highest enthalpy of neutralisation?

- A: NH_4OH and CH_3COOH
- B: NH_4OH and HCl
- C: KOH and CH_3COOH
- D: KOH and HCl

20. Which of the following reaction would give the enthalpy of reaction?

- A: $H_2(g) + 2O_2(l)$ ---------> $2H_2O(l)$ at 298 K and 1 atm
- B: $H_2(g) + 2O_2(g)$ ---------> $2H_2O(l)$ at 298 K and 1 atm
- C: $H_2(g) + 2O_2(g)$ ---------> $2H_2O(g)$ at 298 K and 1 atm
- D: All of the above.

TEST 4

1. **Heat capacity of the bomb calorimeter is 80 kJ/K, if change in temperature is 5K then what is the heat evolved?**

- A: 16 kJ
- B: 32 kJ
- C: 124 kJ
- D: 400 kJ

2. **In which of the following conversions, value of ΔS will be negative?**

- A: H_2O (l) ---> H_2O (g)
- B: H_2O (S) ---> H_2O (l)
- C: H_2O (g) ---> H_2O (S)
- D: H_2O (S) ---> H_2O (g)

3. **Enthalpy of combustion is?**

- A: Always positive
- B: Always negative
- C: May be positive or negative.
- D: Same for all reactions.

4. **Which of the following equations correctly represents the standard enthalpy of formation ΔH^o_f of methane?**

- A: C (diamond) + 4H(g) --> CH_4(g)
- B: C (diamond) + $2H_2$(g) --> CH_4(g)
- C: C (graphite) + $2H_2$(g) --> CH_4(g)
- D: C (graphite) + 4H(g) --> CH_4(g)

5. **The enthalpy of formation of H_2O (l) is - 285.77 kJ mol^{-1}. Enthalpy of neutralization of a strong acid and strong base is - 56.07 kJ mol^{-1}. What is the enthalpy of formation of OH^- ion?**

- A: -229.7 KJ
- B: +229.7 KJ
- C: +350.7 KJ
- D: -350.7 KJ

6. **A hypothetical reaction A --->2B, proceeds through following sequence of steps**

A ---> C $\Delta H = q$, *C ---> D* $\Delta H = r$, *½ D ---> B* $\Delta H = s$

Then the heat of reaction A --->2B is?

- A: q - r – s
- B: q - r + 2s
- C: q + r + s
- D: q + r + 2s

7. Which of the following is not a state function?

- A: Volume
- B: Temperature
- C: Work
- D: Enthalpy

8. Which of the following has the highest magnitude?

- A: Heat of vaporization.
- B: Heat of condensation.
- C: Heat of sublimation.
- D: All have same value.

9. Which of the following is true about the spontaneous processes?

- A: They are always endothermic.
- B: They are always exothermic.
- C: They may be exothermic or endothermic.
- D: They are always isothermic.

10. Which of the following accurately defines the enthalpy of solution?

- A: The amount of heat evolved when one mole of a substance is dissolved in so much solvent that further dilution results in no detectable heat change.
- B: The amount of heat absorbed when one mole of a substance is dissolved in so much solvent that further dilution results in no detectable heat change.
- C: The amount of heat absorbed or evolved when one mole of a substance is dissolved in so much solvent that further dilution results in no detectable heat change.
- D: The amount of heat absorbed or evolved when one mole of a substance is dissolved in so much water that further dilution results in no detectable heat change.

11. Lattice energy of an ionic crystal is the ethalpy of:

- A: Combustion
- B: Dissociation
- C: Formation
- D: Dissolution

12. Enthalpy change that occurs when number of moles of reactants as indicaed by the balanced chemical equation react at STP is called?

- A: Enthalpy of formation.
- B: Enthalpy of atomization.
- C: Standard enthalpy of reaction.
- D: Enthalpy of neutralization.

13. Reactants have high energy than products in:

- A: Endothermic reactions
- B: Exothermic reactions
- C: Photochemical reactions
- D: Non-sapontaneous reactions

14. Heat evolved or absorbed in a glass calorimeter is given by the mathematical equation?

- A: $q = m/s\Delta T$
- B: $q = s\Delta T$
- C: $q = c\Delta T$
- D: $q = ms\Delta T$

15. The scope of thermo chemistry is limited because?

- A: Only a few reactions have heat exchange.
- B: Study of heat exchange is not important.
- C: In most of the reactions, heat produced in the system is negligible as compared to the surroundings.
- D: Heat reaction can be accurately measured only for a few reactions.

16. In standard ethalpy of atomization heat of surrounding:

- A: Remains same1
- B: Increases
- C: Decreases
- D: Increases then decreases

17. All of the following processes are spontaneous except ?

- A: $H_2O_{(l)}$ ----> $H_2O_{(g)}$
- B: Combustion of natural gas.
- C: Neutralization of HCI by NaOH.
- D: Synthesis of glucose by plants.

18. Standard enthalpy of solution of ammonium chloride in kJ/mol is?

- A: +25
- B: +16.2
- C: +14.78
- D: +26.0

19. An ideal solution has an enthalpy of solution equal to?

- A: A positive value.
- B: A negative value.
- C: May be positive or negative.
- D: Zero.

20. As per Hess's law $\Sigma\Delta H$ (reaction) = ?

- A: Zero
- B: $\Sigma\Delta H$ (products) - $\Sigma\Delta H$ (reactants)
- C: $\Sigma\Delta H$ (products) + $\Sigma\Delta H$ (reactants)
- D: $\Sigma\Delta H$ (reactants) - $\Sigma\Delta H$ (products)

Chemical Equilibrium

TEST 1

1. K_c has no units if?

- A: K_c never has units.
- B: Reactants moles at equilibrium are higher than products moles.
- C: Products moles at equilibrium are higher than reactants moles.
- D: Reactants moles at equilibrium are equal to the products moles.

2. Lowering temperature favors the yield of ammonia in Haber process. However, the temperature is not lowered below 400°C because?

- A: It is expensive to maintain lower temperature.
- B: Rate of formation of ammonia is low at lower temperatures.
- C: Yield starts decreasing beyond this threshold temperature.
- D: Lowering temperature would lower pressure that decreases yield

3. The "pH" of our blood is:

- A: 6.7-8
- B: 7.5
- C: 7.9
- D: 7.35 - 7.4

4. A system at equilibrium can be disturbed by:

- A: Concentration change
- B: Pressure change
- C: Temperature
- D: All of the above

5. Which of the following is true as per the law of mass action?

- A: Rate at which reaction proceeds is directly proportional to the product of masses of the reactants.
- B: Rate at which reaction proceeds is directly proportional to the product of active masses of the reactants.
- C: Rate at which reaction proceeds is directly proportional to the sum of active masses of the reactants.
- D: Rate at which reaction proceeds is independent of the active masses of the reactants.

6. Conjugate base of a weak acid is?

- A: Weak base
- B: Very weak base
- C: Strong base
- D: Weak acids do not have a conjugate base

7. The chemical substance, when dissolved in water, gives "H" is called:

- A: Neutral.
- B: Base.
- C: Acid.
- D: Amphoteric.

8. Active mass of solutions is represented in terms of?

- A: grams
- B: moles
- C: moles / dm^3
- D: None of the above.

9. The study of equilibrium constant provides us which of the following information?

- A: Direction of reaction
- B: Extent of reaction
- C: Effect of various factors on equilibrium position
- D: All of the above.

10. Relation between K_P and K_c is?

- A: $K_p = K_c / (RT)^{2n}$
- B: $K_p = K_c(RT)^n$
- C: $K_p = K_c / (RT)^{\Delta n}$
- D: $K_p = K_c(RT)^{\Delta n}$

11. K_w = ?

- A: $K_a \times K_b$
- B: K_a / K_b
- C: K_b / K_a
- D: $K_a + K_b$

12. When reactant and product moles at equilibrium are not equal, K_c has units related to?

- A: Concentration
- B: Volume
- C: Pressure
- D: Concentration or Pressure.

13. When 10^{-4} mole of a mono basic strong acid is dissolved in 1 liter of the solvent, its pH is?

- A: $\log 10^{-4}$
- B: $1 / \log 10^{-4}$
- C: $- \log 10^{-4}$
- D: $-1 / \log 10^{-4}$

14. Buffer capacity of a solution is defined as?

- A: It capacity to remain neutral.
- B: Its capability to resist a change in pH
- C: Extra cautions in a buffer
- D: Extra anions in a buffer

15. Suppression of ionization of a weak electrolyte by adding a common ion from outside is called?

- A: Common electrolyte effect.
- B: Ionization effect.
- C: Common ion effect.
- D: Le-Chatelier's principle

16. pH for acidic solutions is?

- A: Less than 7
- B: Greater than 7
- C: Equal to 7
- D: Zero.

17. 2.45g of PbF_2 is dissolved in one liter of water. What are the number of moles if molecular mass of PbF_2 = 245.

- A: 0.01 mole
- B: 0.1 moles
- C: 1 mole
- D: 10 mole

18. K_a = ?

- A: $[H_3O^+] [A^-] / [HA] [H_2O]$
- B: $[H_3O^+] / [HA] [H_2O]$
- C: $[H_3O^+] [A^-] / [H_2O]$
- D: $[H_3O^+] [A^-] / [HA]$

19. Which of the following statement is true as per Le-Chatelier's Principle?

- A: If a stress is applied to a system before it reaches equilibrium the system acts to nullify the effect of stress.
- B: If a stress is applied to a system before it reaches equilibrium the system acts to support the effect of stress.
- C: If a stress is applied to a system at equilibrium the system acts to support the effect of stress.
- D: If a stress is applied to a system at equilibrium the system acts to nullify the effect of stress.

20. If the value of K_c is small this means that?

- A: Reaction has equal amount of products and reactants at equilibrium
- B: Equilibrium is favored towards the forward direction.
- C: Equilibrium is less favored towards the forward direction.
- D: The reversible reaction would never reach an equilibrium

TEST 2

1. A breaker contains a solution of $KClO_3$. When potassium chloride (KCI) is added to this solution, some of $KClO_3$ is precipitated. We may infer that?

- A: $KClO_3$ is more soluble in water than KCI
- B: KCI is more soluble in water than $KClO_3$
- C: Both $KClO_3$ and KCI are soluble water to some extent
- D: Both $KClO_3$ and KCI have same level of solubility in water

2. If at any temperature, K_c is the equilibrium constant of the reaction, N_2 (g) + $3H_2$ (g) $\rightleftharpoons$ 2 NH_3 (g), what will be the affect of increasing pressure from 5 atm.to 50 atm.?

- A: Decrease the yield of ammonia as well as value of Kc.
- B: Increase the yield of NH_3 but will not change the value of Kc.
- C: Increase the yield of NH_3 as well as the value of Kc.
- D: Decrease the yield of ammonia as well as the value of Kc.

3. Which of the following reversible reactions will not be affected by the change in pressure?

- A: $2SO_2 + O_2$ ---> $2SO_3$
- B: $N_2 + O_2$ ---> 2NO
- C: $N_2 + 3H_2$ ---> $2NH_3$
- D: All of them would be affected by the change in pressure.

4. Which of the following statement is true?

- A: Strong bases would have large values for K_b and pK_b.
- B: Strong bases would have small values for K_b and pK_b.
- C: Strong bases would have small value for K_b and large value for pK_b.
- D: Strong bases would have large value for K_b and small value for pK_b.

5. The value of K_c is affected by?

- A: Temperature
- B: Pressure
- C: Concentration
- D: None of the above.

6. The value of equilibrium constant Kc for a given reaction $2HF \rightleftharpoons H_2 + F_2$ is 10^{-3} at 2000 ºC . What will be value of Kp?

A: 2×10^{-13}

B: 10^{-13}

C: 186×10^{-13}

D: 3.48×10^{-9}

7. Which of the following is true regarding the effect of catalyst on equilibrium?

A: Catalyst tend to increase the rate of reaction in the forward reaction.

B: Catalyst tends to increase the rate of reaction in the reverse direction.

C: Catalyst has no effect on the rate of reaction.

D: Catalyst increases the rate of reaction in both forward and reverse direction and has no effect on the equilibrium.

8. Hydroxyl ion concentration of 10^{-2} M HCl is?

A: 10^{-2}

B: 10^{-6}

C: 10^{-12}

D: 10^{-14}

9. Acidic buffers are created by?

A: Mixing a weak acid and a salt of it with a weak base.

B: Mixing a weak acid and a salt of it with a strong base.

C: Mixing a weak base and a salt of it with a strong acid.

D: Mixing a weak base and a salt of it with a weak acid.

10. Which catalyst is used in the Haber's process?

A: Sodium mixed with Al_2O_3

B: Copper mixed with MgO

C: Iron mixed with MgO

D: Potassium mixed with Al_2O_3

11. Which of the following statement is true about water?

A: K_w of water is 14.

B: It is a weak electrolyte.

C: It is a strong electrolyte.

D: Addition of acid changes the ionic product of water.

12. If heat of solution of a salt is close to zero then increasing temperature?

- A: Increases its solubility
- B: Decreases its solubility
- C: Has no effect on its solubility
- D: Could be any of the above.

13. In haber process for manufacturing of ammonia ,nitrogen is taken from:

- A: Proteins occuring in bodies
- B: Ammonium salts obtained industrially
- C: Air
- D: Minerals containing nitrates

14. pOH of basic buffer is given by?

- A: $pOH = pK_b + \log [salt] / [base]$
- B: $pOH = pK_b + \log [base] / [salt]$
- C: $pOH = pK_b - \log [salt] / [base]$
- D: $pOH = pK_b - \log [base] / [salt]$

15. In the reaction $PCl_5 (g) \rightleftharpoons PCl_3 (g) + Cl_2 (g)$, the equilibrium concentrations of PCl_5 and PCl_3 are 0.4 and 0.2 mole/litre respectively. If the value of K_C is 0.5, what is the concentration of Cl_2 in mole/litre?

- A: 0.5
- B: 1.0
- C: 1.5
- D: 2.0

16. Value of K_c for the given equation is?

$aA + bB \rightleftharpoons cC + dD$

- A: $[A]^a[B]^b / [C]^c[D]^d$
- B: $[C]^c[D]^d / [A]^a[B]^b$
- C: $[A]^a[B]^b * [C]^c[D]^d$
- D: $[C] [D] / [A] [B]$

17. If in AgCl solution,some NaCl salt is added ,AgCl will precipitated out due to:

- A: Solubility
- B: Electrolyte
- C: Unsaturation effect
- D: Common ion effect

18. At a given temperature the equilibrium constant for the reaction of carbon monoxide and oxygen to produce carbon dioxide is very large ($K_c = 5 \times 10^{35}$). When the reaction is at equilibrium which of the following would be true?

- A: Concentration of carbon dioxide will be much larger than both reactants.
- B: Concentration of carbon dioxide will be much smaller than concentrations of both reactants.
- C: Concentration of carbon monoxide will be much larger than the concentration of carbon dioxide
- D: Concentration of oxygen will be much larger than concentration of carbon monoxide

19. If $K_a > 1$ then the acid is?

- A: Very weak
- B: Weak
- C: Moderate
- D: Strong

20. Solubility of $Ce(SO_4)_3$:

- A: Increase with the increase in temperature
- B: Decrease with the increase in temperature
- C: Remains constant with increasing temperature
- D: None of the above

TEST 3

1. **In the equilibrium $PCl_5 \rightleftharpoons PCl_3 + Cl_2$; $\Delta H = 22$ kcal, the disintegration of PCl_5 will be more on?**

   - A: Increasing pressure
   - B: Increasing concentration of cholorine
   - C: Increasing temperature
   - D: Decreasing temperature

2. **At constant temperature, diluting an acid would have what effect on its K_a?**

   - A: K_a would increase.
   - B: K_a would decrease.
   - C: K_a would remain same.
   - D: K_a would decrease sharply.

3. **If V is the volume, a is number of moles of N_2O_4 and x is the number of moles of N_2O_4 decomposed. The K_c for the given equation is?**

   $N_2O_4 \rightleftharpoons 2NO_2$

   - A: $4x^2V / (a-x)$
   - B: $4x^2 / (a-x)V$
   - C: $2x^2 / (a-x)V$
   - D: $2xV / (a-x)$

4. **Optimum conditions for Haber's process are?**

   - A: P = 200-300 atm and T = 673 K
   - B: P = 100-200 atm and T = 673 K
   - C: P = 200-300 atm and T = 473 K
   - D: P = 100-200 atm and T = 473 K

5. **What will be the pH of a solution NaOH of concentration of 10^{-3}M?**

   - A: 3
   - B: 7
   - C: 11
   - D: 14

6. **What is the pH of a buffer solution in which 10 M of CH_3COONa and 1 M of CH_3COOH are present. pKa for $CH_3COOH = 4.74$.**

   - A: 3.82
   - B: 4.74
   - C: 4.89
   - D: 5.74

7. Which of the following statement is true about K_w?

- A: Value of K_w increases linearly with increasing temperature.
- B: Value of K_w decreases linearly with increasing temperature.
- C: Value of K_w increases non-linearly with increasing temperature.
- D: Value of K_w decreases non-linearly with increasing temperature.

8. A --> B + C,

If Kp = 1.2 at 1000 K what is the value of K_c for the given reaction?

- A: 0.010
- B: 0.015
- C: 0.025
- D: 0.038

9. The solubility of $Mg(OH)_2$ is S moles/ litre. The solubility product under the same condition is?

- A: $2S^3$
- B: $4S^3$
- C: $2S^2$
- D: $4S^2$

10. 0.005 M acid solution has pH of 5. The percentage ionization of acid is?

- A: 0.2 %
- B: 0.4 %
- C: 0.6 %
- D: 0.8 %

11. The solubility of CaF_2 in pure water is 2.0×10^{-6} mol dm^{-3}. Its solubility product will be?

- A: 2×10^{-12}
- B: 4×10^{-12}
- C: 12×10^{-18}
- D: 32×10^{-18}

12. A 0.1 mol/dm^3 aqueous solution of a weak acid is 2% ionized. If the ionic product of water is 1×10^{-14} the $[OH^-]$ is?

- A: 2×10^{-11}
- B: 1×10^{-12}
- C: 4×10^{-14}
- D: 5×10^{-12}

13. **1 mol/L of A_2 is present as a reactant. At equilibrium 11% of it gets dissociated into B and C according to the given equation**

$A_2 \rightleftharpoons B + C$

K_c for the reaction is?

- A: 1.2
- B: 1.36
- C: 1.48
- D: 2.36

14. **Equilibrium in which of the following reaction is not affected by changes in volume?**

- A: $2SO_2 + O_2 \rightleftharpoons 2SO_2$
- B: $PCl_5 \rightleftharpoons PCl_3 + Cl_2$
- C: $N_2 + 3H_2 \rightleftharpoons 2NH_3$
- D: $2HF \rightleftharpoons H_2 + F_2$

15. **Two moles of PCl_5 were heated to 400^0C in a 2-litres closed vessel. At equilibrium, 40% of PCl_5 was dissociated into PCl_3 & Cl_2. Its K_C will be?**

- A: 0.267 mol/liter
- B: 0.548 mol/liter
- C: 2.342 mol/liter
- D: None of the above.

16. **If difference in pK_a of two acids is 2 then?**

- A: One acid is two times stronger than the other.
- B: One acid is ten times stronger than the other.
- C: One acid is twenty times stronger than the other.
- D: One acid is hundred times stronger than the other.

17. **The aqueous solution of which of the following would produce an Acidic buffer solution?**

- A: $NH_4Cl + NH_4OH$
- B: $CH_3COONa + CH_3COOH$
- C: $NaCl + NaOH$
- D: $Na_2SO_4 + H_4SO_4$

18. **The solubility product of As_2O_3 is S. What is the value of K_{sp} if As_2O_3 dissolves as $2As^{3+} + 3\ O^{2-}$?**

- A: $6s^3$
- B: $48s^4$
- C: $108s^5$
- D: $27s^7$

TEST 4

1. If A_x B_y ⇌ xA^{+y} + yB^{-x} then the value of value of K_{sp} is?

- A: $K_{sp} = [A^{+y}]^x [B^{-x}]^y$
- B: $K_{sp} = x[A^{+y}] y[B^{-x}]$
- C: $K_{sp} = [A^{+y}]^y [B^{-x}]^x$
- D: $K_{sp} = [A^{+y}]^y + [B^{-x}]^x$

2. A + B ⇌ C + D. If some of the C is removed at equilibrium the reaction would?

- A: Remain at equilibrium
- B: Proceed in forward direction
- C: Proceed in reverse direction
- D: Reaction would continue to never reach an equilibrium

3. Formation of ammonia is a reversible and exothermic process, what will happen on cooling?

- A: More N_2 will be formed
- B: More H_2 will be formed
- C: More products (ammonia) will form
- D: More reactant will form

4. 2HI ---> H_2 + I_2 is a reversible reaction. It is not affected by which of the following?

- A: Temperature
- B: Catalyst
- C: Volume
- D: Pressure

5. If at any particular time, the ratio fo products and reactancts is less than K_c then which of the following is true?

- A: The reaction is at equilibrium
- B: Forward reaction would occur
- C: Reverse reaction would occur
- D: None of the above.

6. The favorable conditions for Haber's process are?

- A: High temperature and high pressure
- B: Low temperature and low pressure
- C: High temperature and low pressure
- D: Low temperature and high pressure

7. For a reaction equilibrium, N_2O_4 (g) ⇌ $2NO_2$ (g), the concentrations of N_2O_4 and NO_2 at equilibrium are 4.8 x 10^{-2} and 1.2 x 10^{-2} mol/L respectively. The value of K_c for the reaction is?

- A: 0.25 x 10^{-2} mol/L
- B: 0.3 x 10^{-3} mol/L
- C: 3 x 10^{-3} mol/L
- D: 4.8 x 10^{-2} mol/L

8. If K_a for an acid is higher, the stronger is the acid, relate the strength of acid with pK_a:

- A: Higher pK_a ,weaker the acid
- B: Lower pK_a ,stronger the acid
- C: pK_a has no relation with the strength of an acid
- D: Both a and b

9. A buffer solution is that which resists / minimizes the change in:

- A: Ph
- B: pOH
- C: PK_a
- D: PK_b

10. In the Haber's process, volume of ammonia at equilibrium is?

- A: 25%
- B: 35%
- C: 45%
- D: 55%

11. Units of K_c for this reaction is?

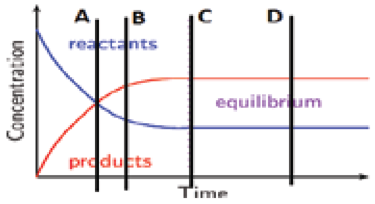
$H_2 + I_2$ -----> 2HI

- A: mol^2dm^{-6}
- B: $mol\ dm^{-3}$
- C: No unit
- D: $mol^{-2}dm^6$

12. 0.5 molar solution of NaOH contains?

- A: 40g of NaOH in 1 lit of solution
- B: 20g of NaOH in 1 lit of solution
- C: 80g of NaOH in 1 lit of solution
- D: 10g of NaOH in 1 lit of solvent

13. In the graph below, the equilibrium time is given by which line?



- A: A
- B: B
- C: C
- D: D

14. For the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, the equilibrium constants expressed in terms of concentration K_c and in terms of partial pressures K_p, are related as?

- A: $K_p = K_c(RT)^2$
- B: $K_c = K_p(RT)^2$
- C: $K_p = K_c$
- D: $K_p = K_c(RT)^3$

Solutions

TEST 1

1. **Which of the following statements is not true about the ideal solutions?**

- A: There is no enthalpy change on mixing.
- B: There is no volume change on mixing.
- C: The interactions between the components are similar to those in the pure components.
- D: The components show positive and negative deviations from Raoult' s law.

2. **Which of the following is/are important day to day application of colligative properties of solutions?**

- A: Creation of CFCs.
- B: Creation of antifreeze.
- C: Creation of transmission fluids.
- D: All of the above.

3. **Elevation of the boiling point of a solution can be measured by which of the following method?**

- A: Colligative method.
- B: Landsberger's method.
- C: Beckmann's apparatus.
- D: Raoult's method.

4. **Which of the following is true for a solution?**

- A: Solute = Solvent
- B: Solute < Solvent
- C: Solute > Solvent
- D: Solute may or may not be less than the solvent

5. **The amount of energy release by absorbing an electron in valence shell is:**

- A: Atomization
- B: Electron energy
- C: Electro negativity
- D: Ionization energy

6. **The process in which the water molecules surround the solute ions or molecules is called?**

- A: Hydrolysis
- B: Hydrogenation
- C: Halogenations
- D: Hydration

7. Which of the following is an example of immiscible solution?

- A: NaCl-Water
- B: Phenol-Water
- C: Nicotine-Water.
- D: Water-Benzene

8. Which of the following conditions should be fulfilled by a solution in order to abserve the colligative properties?

i. Solution should be dilute ii. Solution should be non-volatile,

iii. Solution should be non-electrolyte

- A: i and ii only
- B: i and iii only
- C: ii and iii only
- D: i, ii and iii.

9. Which of the following defines the colligative properties of the solutions?

- A: Properties that remains constant over a range of temperature.
- B: Properties that remains constant over a range of pressure.
- C: Properties that depend on the chemical species present.
- D: Properties that depend on the number of solute and solvent molecules.

10. The number of moles of solute in 1000 g of the solvent is called?

- A: Morality
- B: Mole fraction
- C: Parts per million
- D: Molality

11. Which of the following is the most accurate definition of a solution?

- A: A mixture of two or more kinds of different substances.
- B: A heterogeneous mixture of two or more kinds of different substances.
- C: A homogeneous mixture of two or more kinds of different substances.
- D: A homogeneous mixture of two or more kinds of same substances.

12. Which of the following factors account for the solutions' deviations from Raoult's Law?

- A: Size of the molecules,
- B: Shape of the molecules.
- C: Intermolecular forces.
- D: All of the above.

13. Which of the following is the correct definition of molarity?

- A: Number of moles of solute in 1000 g of the solvent.
- B: Number of moles of solute in 100 g of the solvent.
- C: Number of moles of solute in 1 liter of the solution.
- D: Number of moles of solute in 1 mL of the solution.

14. Which of the following is the mathematical representation of Raoult's law?

- A: $p = p^o x$
- B: $p = p^o / x$
- C: $p = p^o + x$
- D: $p = p^o - x$

15. The temperature at which two conjugate solutions merge into one another is called?

- A: Upper consulate temperature
- B: Mixing temperature
- C: Conjugate temperature
- D: None of the above.

16. Which of the following is the most important application of the colligative properties?

- A: Molecular mass determination.
- B: Identification of chemical properties.
- C: Determination of boiling points.
- D: Determination of vapour pressure.

17. A chemical reaction during which molecules of water (H_2O) are split into hydrogen cations ($H+$) and hydroxide anions ($OH-$) is called?

- A: Hydration
- B: Neutralization
- C: Hydrogenation
- D: Hydrolysis

18. Which of the following is true for completely miscible liquids solutions?

- A: Their volume decrease on mixing.
- B: Their volume increase on mixing.
- C: Their volume remain same on mixing.
- D: Their volume may increase or decrease on mixing.

19. Which of the following form conjugate solutions?

- A: Completely miscible liquids
- B: Partially miscible liquids
- C: Immiscible liquids
- D: Both B and C.

20. A sample of matter with uniform properties and fixed composition is called a?

- A: Solution
- B: Phase
- C: Substrate
- D: Solvent

TEST 2

1. **Which of the following is a definition of Rault's law**?

- A: Increase of vapour pressure is directly proportional to the mole fraction of solute.
- B: Increase of vapour pressure is directly proportional to the mole fraction of solvent.
- C: Lowering of vapour pressure is directly proportional to the mole fraction of solute.
- D: Lowering of vapour pressure is directly proportional to the mole fraction of solvent.

2. **Mole fraction of any component is the ratio of moles of all components in a:**

- A: Compound
- B: Solution
- C: Molecule
- D: Solid

3. **Percentage volume/weight concentration is equal to?**

- A: The number of cm^3 of a solute dissolved per 1 g of the solution.
- B: The number of cm^3 of a solute dissolved per 10g of the solution.
- C: The number of cm^3 of a solute dissolved per 100g of the solution.
- D: The number of cm^3 of a solute dissolved per 1000g of the solution.

4. **10 grams of glucose are dissolved in water to make 100cm^3 of its solution, its molarity is**

- A: 0.55
- B: 0.1
- C: 10
- D: 1

5. **Concentration in terms of percentage weight/weight is given by?**

- A: Weight of the solute dissolved per one kg of the solution.
- B: Weight of the solute dissolved per 100 g of the solution.
- C: Weight of the solute dissolved per 1000 parts by weight of the solution.
- D: Weight of the solute dissolved per 100 parts by weight of the solution.

6. **Which of the following unit of concentration can be used for any state of the matter for the solvent or the solute?**

- A: Molality
- B: Molarity
- C: % m/v
- D: Mole fraction

7. Ionic compound dissolve in water in two steps.

i. First step: Separation of ions from solid,

ii. Second step: Solvent molecules surrounding the ions

Which of the following statement is true about this process?

- A: The first step is exothermic and the second is isothermic.
- B: The first step is endothermic and the second is isothermic.
- C: The first step is exothermic and the second is endothermic.
- D: The first step is endothermic and the second is exothermic.

8. Which of the following statements is correct?

- A: Only liquids can act as a solvent in a solution.
- B: Only gases and liquids can act as a solvent in a solution.
- C: Only gases can act as a solvent in a solution.
- D: Solids, liquids and gases all can act as a solvent in a solution.

9. Which of the following salts are easily hydrolysed in water?

i. Salts of stong acids, ii. Salts of weak acids, iii. Salts of weak bases

- A: i only
- B: i and ii only
- C: ii and iii only
- D: i, ii and iii.

10. Suppose, a sample of 100 g of water solution contains 0.025 g of chlorine. The concentration of chlorine in ppm will be?

- A: 25 ppm
- B: 150 ppm
- C: 180 ppm
- D: 250 ppm

11. A student mixed ethyl alcohol with small amount of sodium dichromate and added it to the hot solution of dilute sulphuric acid. A vigorous reaction took place. He distilled the product formed immediately. What was the product?

- A: Acetone
- B: Acetic acid
- C: Dimethyl ether
- D: Acetaldehyde

12. Salts which are not hydrolysed by water give?

- A: Acidic solution.
- B: Basic solution.
- C: Neutral solution.
- D: May give both acidic or basic solution.

13. **Lowering of the vapour pressure of binary solutions is given by the formula? (W_1 and W_2 are the masses of the solvent and the solute and M_1 and M_2 are the molecular masses respectively)**

A: $M_2 = \frac{p^o}{\Delta p}\frac{W_2 M_2}{W_1}$

B: $M_2 = \frac{p^o}{\Delta p}\frac{W_2 M_1}{W_1}$

C: $M_2 = \frac{\Delta p}{p^o}\frac{W_2 M_1}{W_1}$

D: $M_2 = \frac{\Delta p}{p^o}\frac{W_2 M_2}{W_1}$

14. **0.100 mole of NaCl is dissolved into 100.0 grams of pure H_2O. What is the mole fraction of NaCl?**

A: 0.018

B: 0.260

C: 0.564

D: 0.982

15. **Which type of ions are most easily hydrated?**

A: High charge density ions.

B: Moderate charge density ions.

C: Low charge density ions.

D: Neutral molecules.

16. **50 ml of ethanol dissoved in 200 ml of solution gives v/v % of solution = ?**

A: 4 %

B: 25 %

C: 50 %

D: 60 %

17. **Which of the following units of concentration are not affected by temperature?**
i. % w/w, ii. Molarity, iii. Molality

A: i only

B: i and ii only

C: i and iii only

D: i, ii and iii only.

18. **Which of the following unit of concentration would you recommend to calculate impurities in pure water?**

A: Molarity

B: % w/v

C: Parts per million

D: Molality

19. **The vapour pressure of a dilute solution of a solute is not influenced by?**

A: Temperature of the solution.

B: Mole fraction of the solute.

C: Degree of dissociation of the solute.

D: Melting point of the solute.

20. **Sea water has 5.65 x 10^{-3} g of dissolved oxygen in one kilogram of water. The concentration of oxygen in ppm is:**

A: 7.69

B: 5.65

C: 5.20

D: 4.11

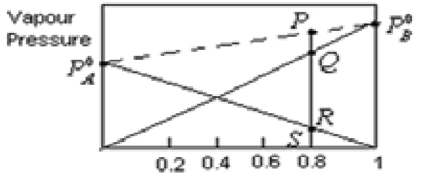
TEST 3

1. Solubility for which of the following salt decrease with the increase in temperature?

A: $Pb(NO_3)_2$ B: $CaCl_2$

C: KCl D: $Ce_2(SO_4)_3$

Consider the following vapour pressure - mole fraction graph. SP (Total vapour pressure of the resultant solution) is equal to

2. 

A: PQ + RS B: PQ + QR + RS

C: SR + SQ D: PQ + QR

3. Which of the following statement is true regarding the molal and molar solution of the same numerical value?

A: Molal aqueous solution of a solute has same concentration as of molar solution.

B: Molal aqueous solution of a solute is dilute as compared to the molar solution.

C: Molar aqueous solution of a solute is dilute as compared to the molal solution.

D: None of the above.

4. 500 mL of 0.75 w/v % NaCl solution would contain how many grams of NaCl?

A: 0.75 g B: 1.5 g

C: 3.75 g D: 4.8 g

5. If 0.5 g of a solute (molar mass 100 g mol-1) in 25 g of solvent elevates the boiling point by 1 K. The molar boiling point constant of the solvent is?

A: 0.2 B: 2

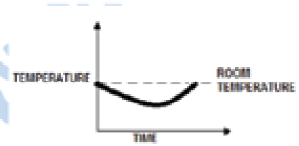
C: 5 D: 8

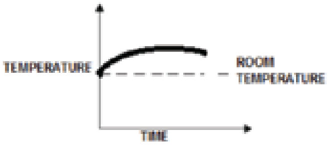
6. **Given soultion contains 16g of CH_3OH , 92g of C_2H_5OH and 36g water. Which statement about mole fraction of component is true?**

- A: Mole fraction of CH_3OH highest among all
- B: Mole fraction of C_2H_5OH and water is same
- C: Mole fraction of CH_3OH and C_2H_5OH is same
- D: Mole fraction of water is lowest

7. **Dissolution of ammonium nitrate in water is an endothermic process. Which of the following graphs shows how the temperature alerts as the ammonium nitrate is added to water and then the solution is left at room temperature?**

- A:

- B: 

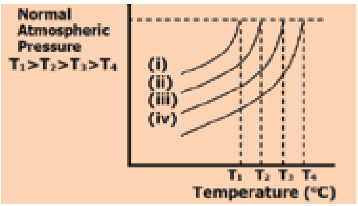
- C: 

- D:

8. **g of a non-electrolyte solute (molar mass 250 g mol-1) was dissolved in 51.2 g of benzene. If the freezing point depression constant, Kf of benzene is 5.12 K kg mol-1, the freezing point of benzene will be lowered by?**

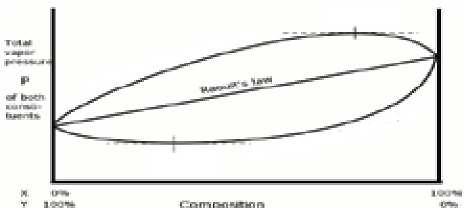
- A: 0.5 K
- B: 0.4 K
- C: 0.2 K
- D: 0.1 K

9. **The vapour pressure lines for pure as well as solutions of different concentrations are shown below. Which line represents pure water?**



- A: I
- B: II
- C: III
- D: IV

10. The composition-temperature curve given below is for what type of mixtures?



- A: Zeotropic mixtures.
- B: Azeotropic mixtures.
- C: Partially miscible mixtures.
- D: Fully miscible mixtures.

11. What is the mole fraction of cinnamic acid in a mixture that is 50.0% weight urea in cinnamic acid (urea = 60 g/mol; cinnamic acid = 148 g/mol)

- A: 0.62
- B: 0.56
- C: 0.48
- D: 0.28

12. The total vapour pressure of a mixture of 2 mole of A (Pa^o =140 mm) and 1 mole of B (Pb^o = 220 mm) is 180 mm. The solution?

- A: is an ideal solution.
- B: exhibits positive deviation from Raoult's law.
- C: exhibits negative deviation from Raoult's law.
- D: cannot be identified as data is insufficient.

13. A non-ideal solution was prepared by mixing 10 ml HCl and 90 ml of water. The volume of mixture will be?

- A: > 100 ml
- B: < 100 ml
- C: = 100 ml
- D: Could be higher or lower than 100 ml

14. The molality of an aqueous solution of sugar ($C_{12}H_{22}O_{11}$) is 1.62m. Calculate the mole fraction of sugar?

- A: 0.0911
- B: 0.0864
- C: 0.0462
- D: 0.0284

15. Approximately how many moles of water must be used to dissolve 100.0 grams of sucrose ($C_{12}H_{22}O_{11}$) to prepare a 0.020 mole fraction of sucrose in the solution? (Weight of sucrose is 342 g/mol.)

- A: 14 mol of H_2O
- B: 16 mol of H_2O
- C: 18 mol of H_2O
- D: 20 mol of H_2O

16. What is the molarity of a solution prepared by dissolving 15.0 g of sodium hydroxide in enough water to make a total of 225 mL of solution?

- A: 0.78 M/L
- B: 1.67 M/L
- C: 37.5 M/L
- D: 66.6 M/L

17. A solution is prepared by mixing 25.0 g of water, H_2O, and 25.0 g of ethanol, C_2H_5OH. Determine the mole fractions of ethanol?

- A: 0.18
- B: 0.29
- C: 0.71
- D: 0.88

18. If 1.2 g of NaCl is dissolved in water to make 160 mL of (saline) solution, what is the w/v % of NaCl?

- A: 0.75 %
- B: 1.20 %
- C: 1.50 %
- D: 1.92 %

19. If we have 450 g of an NaCl solution that is 35 NaCl w/w %. What is the mass of NaCl ?

- A: 128.5 g
- B: 157.5 g
- C: 184.5 g
- D: 200 g

20. If x ml of solute is added to y ml of solvent. The total volume of the solution is?

- A: x + y
- B: x - y
- C: x * y
- D: None of the above.

TEST 4

1. **Antifreeze is made by a solution of water with?**

- A: Ethanol
- B: Isobutyl Chloride
- C: Acetone
- D: Ethylene glycol

2. **Which of the following solvents would not be able to dissolve NaCl?**

- A: Water
- B: Acetone
- C: Ethanol
- D: Methanol

3. **A 4 g sugar cube (Sucrose: $C_{12}H_{22}O_{11}$) is dissolved in 0.5 kg of water. What is the molality of the sugar solution?**

- A: 0.023 mol/kg
- B: 0.117 mol/kg
- C: 0.21 mol/kg
- D: 1.2 mol/kg

4. **On adding solute to a solvent having vapor pressure 0.80 atm, vapor pressure reduces to 0.60 atm. Mole fraction of the solute is?**

- A: 0.25
- B: 0.48
- C: 0.75
- D: 0.90

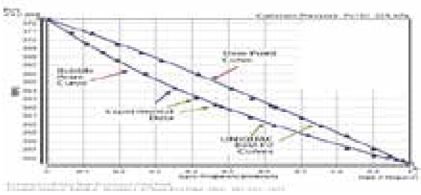
5. **Azeotropic mixtures can not be regarded as chemical compounds because?**

- A: They are completely separated through fractional distillation.
- B: They can not be separated through fractional distillation.
- C: Their composition remain constant on changing pressure and temperature.
- D: Their composition varies on changing pressure and temperature.

6. **5 g sugar is dissolved in 20 g of water. What is the w/w % concentration of sugar in this solution?**

- A: 5 w/w %
- B: 15 w/w %
- C: 20 w/w %
- D: 25 w/w %

7. **The composition-temperature curve given below is for what type of mixtures?**



- A: Zeotropic mixtures.
- B: Azeotropic mixtures.
- C: Partially miscible mixtures.
- D: Fully miscible mixtures.

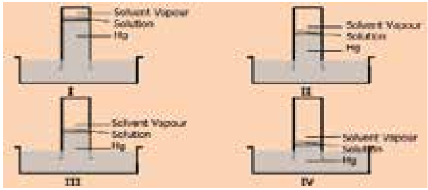
8. **The crystalline substances that contain chemically combined water in definite proportions are called?**

- A: Hydrides
- B: Watered Crystals
- C: Hydrites
- D: Hydrates

9. **2.0 g of benzoic acid dissolved in 25.0 g of benzene shows a depression in freezing point equal to 1.62 K. Molal depression constant kf of benzene is 4.9 K kg mol-1. What is the molar mass of the acid?**

- A: 196
- B: 212
- C: 242
- D: 284

10. **One mole of glucose was dissolved in one kg of water, ethanol, ether, benzene separately and molal boiling point constant of each solution was found to be 0.52 ,1.75, 2.16 and 2.70 in the units of / $^{o}Ckgmol^{-1}$. Which of the following figure shows solvent in solution**



- A: I
- B: II
- C: III
- D: IV

11. **The rise in the boiling point of a solution containing 1.8 g of glucose in 100 g of solvent is 0.1°C. The molal elevation constant of the liquid is? (Molar mass of glucose is 180)**

- A: 0.01
- B: 0.1
- C: 1
- D: 10

12. **Boiling point constants help us to determine:**

- A: Volumes
- B: Pressures
- C: Masses
- D: Molar masses

13. Which one of the following is the correct representation of k_{sp} ?

- A: $K_{sp} = [AgCl] / [Ag^{+1}][Cl^{-1}]$
- B: $K_{sp} = [Ag^{+1}][Cl^{-1}] / [AgCl]$
- C: $K_{sp} = [Ag^{+1}][Cl^{-1}]$
- D: $K_{sp} = [AgCl]$

14. Miscible liquid mixtures that can be separated by fractional distillation are called?

- A: Partially miscible solutions.
- B: Completely miscible solutions.
- C: Zeotropic mixtures.
- D: Azeotropic mixtures.

15. Freezing point depression of a solution is measured by which of the following methods?

- A: Beckmann's apparatus.
- B: Landsberger's method.
- C: Raoult's method.
- D: Colligative method.

16. Which of the following solutions will show positive deviation from the ideal behavior of solutions?

- A: Chloroform and diethyl ether
- B: Ethanol and water
- C: Acetone and aniline
- D: Water and nitric acid

17. Which of the following statements is true? (consider equal sized ions)

- A: Neutral molecules are more easily hydrated.
- B: Positive ions are more easily hydrated.
- C: Negative ions are more easily hydrated.
- D: Hydration is independent of the charge density of the ions.

18. Elevation of the boiling point of a solution is?

- A: Directly proportional to the molarity of the solution.
- B: Inversely proportional to the molarity of the solution.
- C: Directly proportional to the molality of the solution.
- D: Inversely proportional to the molality of the solution.

19. As number of solute particles increases, freezing point of the solution:

- A: Remains same
- B: Increases
- C: Decreases
- D: First increase then decrease

20. Which of the following units of concentration does not change with temperature?

- A: % w/v
- B: % v/v
- C: Molarity
- D: Molality

Electrochemistry

TEST 1

1. The electrode potential of standard hydrogen electrode is arbitrarily taken as:

- A: A positive value
- B: A negative value
- C: Zero
- D: Depends upon the situation

2. Which of the following is the electrophone used to attack electrons of benzene ring?

- A: $FeCl_2$
- B: $FeCl_4$
- C: Cl^+
- D: Cl_2

3. In order to have standard hydrogen electrode, the conditions are:

- A: Temperature 25° C, pressure 1 atm, and H^+ concenteration 1M
- B: Temperature 0° C, pressure 1 atm, and H^+ concenteration 1M
- C: Temperature 25° C, pressure 2 atm, and H^+ concenteration 1M
- D: Temperature 25° C, pressure 1 atm, and H^+ concenteration 2M

4. In calculators and digital watches which battery is mostly used?

- A: Alkaline battery
- B: Silver oxide battery
- C: Ni-Cd battery
- D: Pb-storage battery

5. In oxidation process the oxidation number of the element:

- A: Increases
- B: Decreases
- C: Does not change
- D: May increase or decrease.

6. The value of SHE as cathode and anode is always taken to be:

- A: One
- B: Zero
- C: Different
- D: Same

7. **Reduction always takes place at:**

- A: Cathode
- B: Anode
- C: Both electrodes
- D: None of the above

8. **The oxidation potential of Mg and Al are +2.37v and 1.66V respectively. The Mg in chemical reaction:**

- A: Will be displaced by Al
- B: Will displace Al
- C: Won't be able to replace Al
- D: None of the above

9. **In electrochemical series , the electrodes are compared with SHE and they are arranged in the decreasing order of their:**

- A: Cell voltages
- B: Ionization potentials
- C: Reduction potentials
- D: Oxidation potentials

10. **In electrolysis reduction takes place at:**

- A: Anode
- B: Cathode
- C: Both anode and cathode
- D: Depends upon the nature of electrode material

11. **Electrolysis is the process in which a chemical reaction takes place at the expense of:**

- A: Chemical energy
- B: Kinetic energy
- C: Heat energy
- D: Electrical energy

12. **When one metal is deposited on the surface of the other by the process of electrical current, the process is called?**

- A: Electrolytic refining
- B: Electrolytic purification
- C: Electrolysis
- D: Electroplating

13. **The process in which electric current is used to carry out a non-spontaneous redox reaction is called:**

- A: Electrolyte
- B: Electrolysis
- C: Metallic conduction
- D: Combustion

14. A redox reaction is:

- A: A reaction in a solution
- B: Ion combination reaction
- C: Electron transfer
- D: Proton transfer

15. An electrochemical cell is based upon:

- A: Acid-Base reaction
- B: Redox reaction
- C: Nuclear reaction
- D: Catalytic reaction

16. A process of covering one metal with a thin layer of another metal is called:

- A: Electrolysis
- B: Electroplating
- C: Electrode potential
- D: Standard electrode

17. The process in which ionic compound when fused or dissolved in water split up into charged particles is called:

- A: Electrolysis
- B: Hydration
- C: Ionization
- D: Conduction

18. The oxidation number of free element is always taken to be:

- A: 0
- B: 1
- C: 2
- D: -1

19. What is the algebraic sum of oxidation numbers of all the elements in the neutral molecules?

- A: -1
- B: 1
- C: 0
- D: -2

20. One of the following definitions of oxidation is correct. Indicate that:

- A: Addition of oxygen, addition of hydrogen, removal of electron
- B: Removal of electronegative element, removal of electropositive element, gain of electron
- C: Addition of electronegative element, removal of electropositive element, gain of electron
- D: Addition of oxygen, removal of hydrogen, loss of electron

TEST 2

1. Electric current passes through both molten and solution form of NaCl because of?

- A: Ionic bonding
- B: Na^+ and Cl^- ions
- C: Ions of water
- D: Hydration of ions

2. Graphite is an inert electrode. When the electrolysis of aqueous solution of NaCl is carried out by using graphite electrode, then the substance collected at the cathode is:

- A: Hydrogen gas
- B: Sodium metal
- C: Sodium hydroxide
- D: Chlorine gas

3. Zinc-copper galvanic cell may be formed by:

- A: Salt brigde
- B: Porous partitions
- C: Both a and b
- D: None of the above

4. The best reducing agent in the given list is?

- A: F^{-1}
- B: Cl^{-1}
- C: Br^{-1}
- D: I^{-1}

5. Electrochemical series is useful in:

- A: Prediction of the feasibility of a chemical reaction
- B: Comparison of the metals to get oxidized or reduced
- C: Calculation of voltage
- D: All of the above

6. Oxidation number of oxygen +2 in which of the following?

- A: Na_2O
- B: Na_2O_3
- C: F_2O
- D: Cl_2O

7. Which one of the following is a redox reaction?

- A: $NaCl + AgNO_3$ -----> $NaNO_3 + AgCl_2$
- B: $2Na+Cl_2$ ------> 2NaCl
- C: 2Cl -------> $Cl_2 + 2e^-$
- D: $Na^+ + 1e^-$ ---------> Na

8. The reaction in galvanic cell is :

- A: Spontaneous
- B: Non-sapontaneous
- C: Acid-Base
- D: None of these

9. During electrolysis of KNO_3, H_2 is evolved at:

- A: Anode.
- B: Cathode.
- C: Both A and B.
- D: Neither cathode nor anode.

10. In electrolytic cell a salt bridge is used in order to:

- A: Pass electric current
- B: Prevent flow of ions
- C: Mix solutions of two half cells
- D: Allow movement of ions between two cells

11. Standard hydrogen electrode has an arbitrary fixed potential of :

- A: 0 V
- B: 1.0 V
- C: 0.1 V
- D: 0.001 V

12. Study the following facts and choose.

Zn -------> Zn^{2+} +2e^- E^o = +0.76V, **Cu --------> Cu^{2+} +2e^- E^o = -0.34V**

- A: Cu + Zn^{+2} ---------> Cu^{2+} + Zn
- B: Cu^{2+} + Zn^{+2} ---------> Cu + Zn
- C: Cu^{2+} + Zn ---------> Cu + Zn^{2+}
- D: Cu^{2+} + Zn^{+2} ---------> Cu + Zn^{2+}

13. In a galvanic cell, the electrode occupying a lower position in the electrochemical series will act as:

- A: Cathode
- B: Oxidation will take place on it
- C: Reduction will take place on it
- D: Both A and C

14. Which of the following is a secondary cell?

- A: Alkaline battery
- B: Dry cell
- C: H_2-O_2 cell
- D: Mercury cell

15. When fused $PbBr_2$ is electrolyzed then which of the following occurs?

- A: Bromine appears at cathode.
- B: Lead is deposited at cathode.
- C: Lead is deposited at anode.
- D: Both A and C

16. During electrolysis of $H_2SO_{4(aq)}$ O_2 is evolved at?

- A: Cathode
- B: Anode
- C: Both a and b
- D: None of the above

17. If a salt bridge is not used between two half cells, then voltage :

- A: Decreases rapidly.
- B: Decrease slowly.
- C: Does not change.
- D: Drops to zero.

18. The reduction potential of Al is -1.66V and that of Sn is -0.14V. When these two electrodes are connected through a salt bridge, then which of the following electrode act as cathode:

- A: Al electrode
- B: Sn electrode
- C: Depends upon the temperature of cell
- D: Depends upon the concenteration of solution in the salt bridge.

19. Which one is the correct equation of 1st ionization of sulphuric acid?

- A: $H_2SO_4 + H_2O$ -----------> $2H^+ + SO_4^{3-}$
- B: $H_2SO_4 + H_2O$ -----------> $H_3O^+ + HSO_4^-$
- C: $H_2SO_4 + H_2O$ <---- ---> $2H^+ + SO_4^{2-}$
- D: $H_2SO_4 + H_2O$ -----------> $H_2O^+ + SO_4^{2-}$

20. A cell in which sapontaneous redox reaction generates an electric current is called?

- A: Electrolytic cell
- B: Electrochemical cell
- C: Voltaic and galvanic cell
- D: Biological cell

TEST 3

1. **The electrode reaction of a voltaic cell can be reversed when:**

- A: Concenterations of solution are changed
- B: Temperature is increased
- C: Electrodes are interchanged
- D: External circuit is employed to supply the source of electricity

2. **Sulphur has highest oxidation state in:**

- A: SO_2
- B: SO_3
- C: H_2S
- D: H_2SO_3

3. **When Pb accumulator is recharged , then the density of H_2SO_4becomes:**

- A: 2.15 gcm^{-3}
- B: 1.81 gcm^{-3}
- C: 1.25gcm^{-3}
- D: 1.15 gcm^{-3}

4. **If the sum of E^o values of the two half cells is positive, then**

- A: The reaction will not be feasible
- B: The reaction may or may not be feasible
- C: The reaction will be feasible
- D: No prediction can be made.

5. **The reaction given below is an example of:**

$2KI + Cl_2 \text{--->} I_2 + 2KCl$

- A: Chlorination of potassium
- B: Neither oxidation nor reduction
- C: Neutralization reaction
- D: Oxidation reduction reaction

6. **Oxidation number of C in CH_2Cl_2:**

- A: +2
- B: +4
- C: -4
- D: 0

7. **Strong reducing agents have:**

- A: Greater positive value of standard reduction potential
- B: Greater negative value of standard reduction potential
- C: Lesser positive value of standard reduction potential
- D: None of these

8. Strongest reducing agent in the electrochemical series is:

- A: I_2
- B: F
- C: H_2
- D: Li

9. Oxidation number of oxygen in OF_2 is?

- A: +1
- B: -1
- C: +2
- D: -2

10. Oxidation of sulphur in $S_2O_3^{2-}$ is:

- A: +6
- B: -2
- C: +2
- D: +4

11. In the reaction $3Cl_2 + 6NaOH$ -----> $5NaCl + NaClO_3 + H_2O$, chlorine is:

- A: Oxidized
- B: Reduced
- C: Both a and b
- D: None of the above

12. Which one of the following statements about SHE is correct?

- A: Its oxidation potential is zero but reduction potential is positive
- B: Its reduction potential is zero but oxidation potential is negative
- C: Its oxidation potential and reduction potential both are zero
- D: The solution in the electrode is 0.1 molar HCl

13. Oxidation number of C in $NaHCO_3$:

- A: +4
- B: -6
- C: +6
- D: +2

14. The oxidation of oxygen in peroxides is?

- A: +1
- B: -1
- C: +2
- D: -2

15. Which elemnt act as reducing agent in the reaction?

$Zn\ (s) + H_2SO_4\ (aq)$ ------> $ZnSO_4\ (aq) + H_2\ (g)$

- A: Zn
- B: H
- C: S
- D: O

16. Oxidizing power of an element depends upon its:

- A: Oxidation potential
- B: Ionization energy
- C: Electron affinity
- D: Electrode potential

17. Coinage metals have least reactivity because they have:

- A: Positive oxidation potential
- B: Positive reduction potential
- C: Zero oxidation potentials
- D: Zero reduction potentials

18. Which of the following is non-rechargeable battery?

- A: Lead accumulator battery
- B: Alkaline battery
- C: Ni-Cd battery
- D: Fuel cell

19. Metals which are above SHE in electrochemical series:

- A: Can liberate H_2 from dil. Acid
- B: Can not liberate H_2 from dil. acid
- C: Require heat to liberate H_2 from dil. Acid
- D: Require current to liberate H_2 from dil. acid

20. Coinage metals Cu, Ag and Au are least reactive because they have :

- A: Negative reduction potential
- B: Positive Reduction potential
- C: Negative oxidation potential
- D: Posiitive oxidation potential

TEST 4

1. In all oxidation reactions, atoms of an elements in chemical species lose electrons and increases their :

- A: Oxidation state
- B: Reduction state
- C: Electrode
- D: Negative charges

2. What is the correct rotation between pH and PK?

- A: $pH = pK_a + \log [Acid/Base]$
- B: $pH = pK_a - \log [Acid/Base]$
- C: $pH = pK_a + \log [Base/ acid]$
- D: $pK_a = pH + \log [Base/ acid]$

3. When mixture of bauxite($Al_2O_3.2H_2O$) and cryolite (Na_3AlF_6) in the fused state is electrolyzed by using carbon as anode, then the product obtained at the cathod is:

- A: Sodium metal
- B: Aluminium metal
- C: Fluorine gas
- D: The mixture of sodium and aluminium metal

4. In which of the following given changes, there is a transfer of five electrons?

- A: MnO_4^{2-}-----> MnO_2
- B: CrO_4^{2-} ---> Cr^{+3}
- C: MnO_4^{-}-----> Mn^{+2}
- D: $Cr_2O_7^{2-}$ ---> $2Cr^{+3}$

5. Electromotive force of the cell is the:

- A: Difference of two electrode potentials
- B: Sum of two electrode potential
- C: Depends upon the nature of the cell
- D: May be sum of or difference of two electrode potentials

6. During redox reaction, an oxidizing agent:

- A: Gain electrons.
- B: Is oxidized.
- C: Lose electrons.
- D: Is hydrolysed.

7. When copper sulphate is electrolysed in aqueous solution using copper electrodes, then the substance which deposits at the cathode is:

- A: Copper metal
- B: Copper ion
- C: Hydrogen
- D: Oxygen

8. During electrolysis of molten NaCl, the ion is reduced is:

- A: Cl^-
- B: Na^+
- C: Na^+ or Cl^-
- D: Na^+ and Cl^-

9. For the net reaction:

$$Cr^o + Fe^{+3} \text{------>} Cr^{+3} + Fe^o$$

- A: Cr is the oxidizing agent
- B: Fe is cathode
- C: Fe^{+3} is reducing agent
- D: Cr undergoes reduction

10. Stronger the oxidizing agent, greater is the:

- A: Oxidation potential
- B: Reduction potential
- C: Redox potential
- D: E.M.F. of cell

11. The metallic conductors in contact with the solution are called:

- A: Insulator
- B: Electrodes
- C: Electrolyte
- D: Down cell

12. To balance chemical equation by ion-electron method in the basic media we add:

- A: Double the number of oxygen atoms
- B: Double the number of OH^- ions
- C: Double the number of H_2O molecules
- D: Equal number of H^+ ions

13. In order to measure the standard electrode potential of an electrode, which of the following conditions are maintained:

- A: Solution of 1 molar strength and temperature of 0^o C
- B: Solution strength at 25^o C and compared with S.H.E.
- C: Solution of 1 molar strength at 298K compared to S.H.E.
- D: Solution of any strength at any temperature and the electrode is connected with S.H.E.

14. A cell in which current drives a non-sapontaneous reaction is called:

- A: Electrolytic cell
- B: Voltaic cell
- C: Biological cell
- D: Electrochemical cell

15. In $MgCl_2$, the oxidation state of Cl is?

- A: +2
- B: -2
- C: -1
- D: Zero

16. In the reaction :

$2Fe + 3Cl_2 \rightarrow 2FeCl_3$

- A: Fe is reduced.
- B: Fe is oxidized.
- C: Cl_2 is oxidized.
- D: None of the above.

17. Greater the value of standard reduction potential of a species:

- A: Greater is tendency to accept electrons.
- B: Lesser is tendency to accept electrons.
- C: Greater is tendency to lose electrons.
- D: None of the above.

18. Halogens are highly electronegative and they lie below SHE in electrochemical series. For this reason F_2,Cl_2 etc:

- A: React with steam to liberate hydrogen
- B: Can undergo oxidation easily
- C: Can undergo reduction easily
- D: Do not react with the elements very happily above SHE in electrochemical series

19. The highest reduction potential in the electrochemical series is of F_2 and its value is:

- A: +1.49 V
- B: +2.78 V
- C: +2.87 V
- D: -3.87 V

20. The oxidation number of chromium in $K_2Cr_2O_7$ is?

- A: +14
- B: +12
- C: +6
- D: None of these

Reaction Kinetics

TEST 1

1. **The rate of reaction between two specific time intervals is called?**

- A: Average rate of reaction.
- B: Instantaneous rate of reaction.
- C: Total rate of reaction.
- D: Uniform rate of reaction.

2. **The rate of an irreversible reaction?**

- A: Increases with an increase in the concentration of the reactants
- B: Decreases with an increase in the concentration of the reactants
- C: Increases with an increase in the concentration of the products
- D: Decreases with an increase in the concentration of the products

3. **Consider the following reactions**

$$N_2O_5 \rightarrow 2NO_2 + 1/2\ O_2$$
$$SO_2CI_2 \rightarrow SO_2 + CI_2$$
$$H_2 + I_2 \rightarrow 2HI$$

The correct statement about these reactions is ?

- A: i is a second order reaction
- B: ii and iii are first order reactions
- C: iii is a first order reaction
- D: i and ii are first order reactions

4. **Which of the following best defines the activation energy?**

- A: Minimum energy required to start a reaction.
- B: Minimum energy required for effective collisions.
- C: Minimum energy required to activate a catalyst.
- D: Both A and B

5. **Which of the following techniques for measuring the rate of reaction measures the changes in refractive index?**

- A: Spectrometry.
- B: Dilatometric method.
- C: Refractrometric method.
- D: Optical rotation method.

6. **The studies concerned with the rates of chemical reactions are called?**

- A: Thermochemistry
- B: Electrochemistry
- C: Physcial chemistry
- D: Reaction kinetics

7. **The order of reaction with respect to a particular component, 'y' is zero. This implies that?**

- A: The number of molecules forming the activated complex is zero.
- B: The rate of reaction is independent of the concentration of y.
- C: The rate of reaction is proportional to the concentration of y.
- D: The rate of reaction does not vary with temperature.

8. **In zero order reactions, the rate is independent of?**

- A: Temperature of the reaction.
- B: Concentration of the reactants.
- C: Presence of catalysts.
- D: Time at which the rate is determined

9. **Certain substances decreasing the activity of a catalyst are called?**

- A: Negative catalysis.
- B: Catalyst poisoning.
- C: Autocatalysis
- D: Catalyst deactivation.

10. **Unit of rate constant of zero order reaction is?**

- A: sec^{-1}
- B: mol lit^{-1} sec^{-1}
- C: litre mol^{-1} sec^{-1}
- D: $litre^{2}$ mol^{-2} sec^{-1}

11. **A scientist prepared a compound in the laboratory. He found that it has two forms, one powder form and another crystalline form C. Both A and C reacts with sulfuric acid. One possible prediction is that ?**

- A: A has higher rate of reaction.
- B: C has higher rate of reaction.
- C: Both A and C have same rate of reaction.
- D: No prediction can be made from the given information.

12. The units of the rate of reaction are?

A: moles dm^{3} s^{-1}

B: moles dm^{-3} s^{-2}

C: moles dm^{-3} s

D: moles dm^{-3} s^{-1}

13. Which of the following is the correct expression for the rate of reaction?

A: Change in the concentration of the substance / Time taken for the change

B: Change in the concentration of the substance * Time taken for the change

C: Change in the concentration of the substance

D: Change in the concentration of the substance / log (Time taken for the change)

14. The reaction rate in forward direction decreases with the passage of time because:

A: Concentration of products decreases.

B: Concentration of reactants decreases.

C: The order of reaction changes.

D: Temperature of system changes.

15. Two step reaction is given below,

Step 1: A + A ---> C + D (slow step), **Step 2: C + B ----> E + F (fast step)**

Which of the following is the rate determining step?

A: Step 1

B: Step 2

C: Both Step 1 and Step 2

D: Neither Step 1 nor Step 2

16. When the change in concentration is 6×10^{-4} moldm^{-3} and time for that change is 10 seconds, the rate of reaction will be :

A: 6×10^{-2} moldm^{-3}sec^{-1}

B: 6×10^{-3} moldm^{-3}sec^{-1}

C: 6×10^{-4} moldm^{-3}sec^{-1}

D: 6×10^{-5} moldm^{-3}sec^{-1}

17. As per the collision theory, increasing the number of collisions has what effect on the rate of reaction?

- A: Rate of reaction decreases.
- B: Rate of reaction increases.
- C: Rate of reaction may increase or decrease.
- D: Rate of reactions remains constant.

18. Increasing the concentration of the reactants would?

- A: Increase the rate of reaction.
- B: Decrease the rate of reaction.
- C: Has no effect on the rate of reaction.
- D: Depends on the temperature.

19. Consider the following equation

$K = A e^{-Ea/RT}$, In this equation?

- A: A is the number of molecules of the reactant.
- B: A is the number of molecules of the product.
- C: A is the propotionality constant.
- D: A is the Arrhenius constant

20. The substance that fits on the enzyme surface and is converted into product is called ?

- A: Co-factor
- B: Prosthetic group
- C: Isoenzyme
- D: Substrate

TEST 2

1. For third order reactions the half life is?

- A: Independent of the initial concentration of the reactants.
- B: Inversely proportional to the initial concentration of the reactants.
- C: Inversely proportional to the square of the initial concentration of the reactants.
- D: Inversely proportional to the cube of the initial concentration of the reactants.

2. In zero order reaction, the rate is independent of:

- A: Temperature of reaction
- B: Concentration of reactants
- C: Concentration of products
- D: None of these

3. It is experimentally found that catalyst is used to:

- A: Lower the activation energy
- B: Increase the activation energy
- C: Lower pH
- D: Decrease the temperature of other reactants

4. In some reactions , a product formed acts as catalyst. This phenomenon is called:

- A: Negative catalyst
- B: Activation catalyst
- C: Autocatalyst
- D: Heterogeneous catalyst

5. Which of the following gives the rate of reaction when the concentration of the reactants are unity?

- A: $R = k [A]^a [B]^b$
- B: $R = [A]^a [B]^b$
- C: $R = k$
- D: $R = 1/k$

6. Half life of an n order reaction is proportional to?

- A: $1/a^n$
- B: $1/a^{n+1}$
- C: $1/a^{n-1}$
- D: $1/a^{n-2}$

7. For a reaction 2A + B $\rightarrow$ C +D the active mass of B is kept constant and that of A is tripled. It is observed that the rate of reaction:

- A: Decrease three times
- B: Decreases nine time
- C: Increases six times
- D: Increases nine times

8. For calculating the rate of reaction for the gas phase reactions, which units may also used to represent the concentration apart from mol/L?

- A: Volume
- B: Temperature
- C: Pressure
- D: None of the above.

9. Which of the following statement is not true?

- A: At start the instantaneous rate of reaction is higher than the average rate of reaction.
- B: At the end the instantaneous rate of reaction is lower than the average rate of reaction.
- C: Instantaneous rate of reaction is never equal to the average rate of reaction.
- D: Both A and B.

10. Which of the following is not true about the catalysts?

- A: They remain unchanged in the mass and chemical composition throughout the reaction.
- B: They are more effective in finely divided form.
- C: They start the chemical reactions which otherwise are thermodynamically not feasible
- D: Their role is affected by the temperature.

11. What is the effect of light on some chemical reactions?

- A: Light does not effect any chemical reacton except photosynthesis.
- B: Light decreases the rate of reaction by providing negative energy.
- C: Light increases the rate of reaction by providing additional energy.
- D: Light lowers the activation energy of the reactions

12. The half life period of a first order reaction is 10 minutes. What is the rate constant?

- A: $6.93 \times 10^{2} min^{-1}$
- B: $0.693 \times 10^{-2} min^{-1}$
- C: $6.932 \times 10^{-2} min^{-1}$
- D: $69.3 \times 10^{-1} min^{-1}$

13. Increasing temperature by 10K has roughly what effect on the rate of reaction?

- A: No effect.
- B: Reaction rate is reduce to half.
- C: Reaction rate is doubled.
- D: Reaction rate increases 10 times.

14. Why do some reactants react faster in the powdered form?

- A: Powdered form has higher concentration of the reactant.
- B: Powdered form increases the surface area of reaction.
- C: Powdered form lowers the activation energy.
- D: All of the above.

15. In modern Haber process plants ,the temperature maintained during the process is:

- A: 270-370 K(0ºC- 100ºC)
- B: 370-470 K (100ºC- 200ºC)
- C: 570-600 K (300ºC- 380ºC)
- D: 670-770 K (400ºC- 500ºC)

16. Which of the following is not a method for determining the rate of reaction?

- A: Chemical method.
- B: Method of large excess.
- C: Spectrometry.
- D: Optical rotation method.

17. A reaction was found to be in second order with respect to the concentration of carbon monoxide. If the concentration of carbon monoxide is doubled with everything else kept the same, the rate of reaction will?

- A: be doubled.
- B: remain unchanged.
- C: be tripled.
- D: increase by a factor of 4.

18. Which of the following is not a method for finding the order of reactions?

- A: Differential method.
- B: Half life method.
- C: Method of large excess.
- D: Dilatometric method.

19. The rate constant of a first order reaction is 3×10^{-6} per second and initial concentration is 0.10 M. The initial rate of reaction is?

- A: $3 \times 10^{-6}\ ms^{-1}$
- B: $3 \times 10^{-7}\ ms^{-1}$
- C: $3 \times 10^{-8}\ ms^{-1}$
- D: $3 \times 10^{-9}\ ms^{-1}$

20. The number of atoms or molecules whose concentration determines the rate of a chemical reaction is called the ?

- A: Molecularity of the reaction
- B: Order of the reaction
- C: Specific activity of the reaction
- D: Rate constant of the reaction

TEST 3

1. **A plot for Arrhenius equation for a reaction shown the slope = -1000 K. What is the activation energy for this reaction?**

- A: 16 KJ
- B: 17 KJ
- C: 18 KJ
- D: 19 KJ

2. **What is the rate of reaction for the given equation?**

   $2N_2O_5$ -----> $2N_2O_4 + O_2$

- A: $R = k [N_2O_5]$
- B: $R = k [N_2O_5]^2$
- C: $R = k$
- D: $R = k [N_2O_5]^3$

3. **$2 HgCl_2(aq) + C_2O_4^{2-}(aq) \rightarrow 2 Cl^-(aq) + 2 CO_2(g) + Hg_2Cl_2(s)$ has the observed rate equation $=r = k[HgCl_2]^1[C_2O_4^{2-}]^2$.**

   What is the order of the reaction with respect to the oxalate ion?

- A: 0
- B: 1
- C: 2
- D: 3

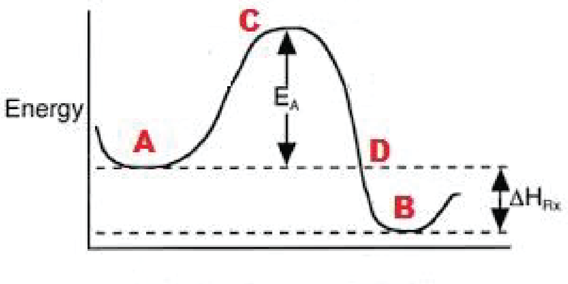
4. **Which of the following statement regarding the order of reactions is correct?**
   i. It can be zero, ii. it can be a fraction, iii. It can be negative.

- A: i only
- B: i and ii only
- C: i and iii only
- D: i, ii and iii.

5. **Instantaneous rate of reaction is given by?**

- A: Δx/Δt
- B: dx/dt
- C: Δx * Δt
- D: dx^2/dt

6. For the Exothermic reaction path shown below, identify the point of activation complex?



- A: A
- B: B
- C: C
- D: D

7. As per Arrhenius equation, k = ?

- A: Ae^{-2RT}
- B: $Ae^{-RT/E}$
- C: $Ae^{-E/RT}$
- D: $Ae^{-Ea/RT}$

8. Light increases the rate of reaction for which of the following reactions?

- A: Reaction between methane and chlorine.
- B: Reaction between Nitrogen monoxide and hydrogen.
- C: Hydrolysis of ester.
- D: None of the above.

9. What is the order of the given reaction with respect to $FeCl_3$?

$2FeCl_3 + 6KI$ ------------> $2FeI_2 + 6KCl + I_2$

- A: 0
- B: 1
- C: 2
- D: 3

10. Which of the following is the mathematical representation of the half life of the second order reactions?

- A: $[t_{1/2}] = 1/k$
- B: $[t_{1/2}] = 0.693/k$
- C: $[t_{1/2}] = 1/ka$
- D: $[t_{1/2}] = 1.5/ka^2$

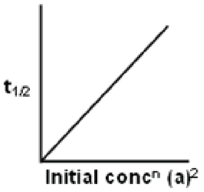
11. **Half life period is independent of the initial concentration of the reactants for?**

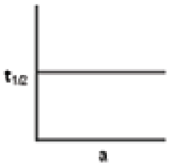
- A: First order reaction.
- B: Second order reaction.
- C: Third order reactions.
- D: All of the above.

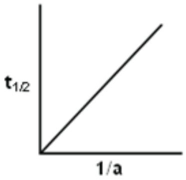
12. **The rate law for a reaction between the substances A and B is given by, rate = $k[A]^n[B]^m$. On doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of the reaction will be?**

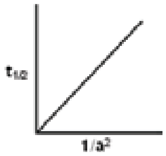
- A: 1/2(m+n)
- B: (m+n)
- C: (m-n)
- D: $2^{(n-m)}$

13. **Which of the following graphs represents relation between initial concentration of reactants and half-life for third order reaction?**

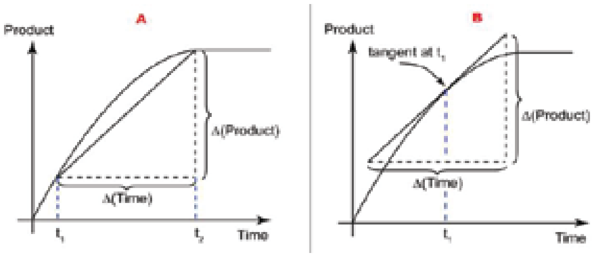
- A: 

- B: 

- C: 

- D: 

14. **For the two graphs given below, which of the following statement is true?**



- A: Both of them give the average rate of reaction.
- B: Both of them give the instantaneous rate of reaction.
- C: A gives the instantaneous while B gives the average rate of reaction.
- D: B gives the instantaneous while A gives the average rate of reaction.

15. aA + bB ----> cC + dD with R = k [B]. In this reaction the concentration of which of the following remains constant?

- A: A
- B: B
- C: C
- D: D

16. What is the half life of a second order reaction if k = 0.08 L mol^{-1} s^{-1} and the initial concentration of the reactant is 0.05 M?

- A: 250 s
- B: 500 s
- C: 775 s
- D: 1000 s

17. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation $k=Ae^{-Ea/RT}$. Activation energy (Ea) of the reaction can be calculated by plotting?

- A: log k vs T
- B: log k vs 1/T
- C: k vs T
- D: k vs 1/log T

18. Which of the following statement is true for the exothermic reactions?

- A: The products are at a lower energy level than the reactants.
- B: Activation energy for forward reaction is more than the backward reaction.
- C: Activation complex is formed at lower energy level as compared to the endothermic reactions.
- D: All of the above.

19. The rate of a third order reaction A + B + C ----> P + Q is 4.2×10^{-2} mol L^{-1} s^{-1}. Find the specific rate constant when the concentrations of A, B and C are 0.25, 0.10 and 0.05 mol L^{-1}respectively. Assume that the balanced equation gives the experimental co-efficient of the reaction rate.

- A: Not enough information given to calculate the answer.
- B: 1.8 L^2 mol^{-2} s^{-1}
- C: 12.4 L^2 mol^{-2} s^{-1}
- D: 33.6 L^2 mol^{-2} s^{-1}

20. Which of the following statements is not correct?

- A: In zero order reaction the rate of the reaction remains constant throughout.
- B: A second order reaction would become a pseudo first order reaction when one of the reactants is taken in large excess.
- C: The value of t1/2 for a first order reaction is independent of initial concentration.
- D: The value of first order rate constant depends on the units of the concentration terms used.

TEST 4

1. **According to the collision theory of bimolecular reactions in gas phase, minimum amount of energy required for an effective collision is known as:**

- A: Heat of reaction
- B: Entropy heat
- C: Enthalpy heat
- D: Energy of activation

2. **For any reaction A ---------> B, which of the following statement is correct regarding the rate of reaction?**

- A: d[A]/dt = d[B]/dt
- B: -d[A]/dt ≠ d[B]/dt
- C: d[A]/dt = - d[B]/dt
- D: -d[A]/dt = d[B]/dt

3. **Hydrolysis of ester is what kind of reaction?**

$$CH_3COOC_2H_5 + H_2O \text{ -----> } CH_3COOH + C_2H_5OH$$

- A: Zero order reaction.
- B: First order reaction.
- C: Pseudo first order reaction.
- D: Second order reaction.

4. **In an enzyme-catalyzed reaction, the reactant concentration is much greater than the enzyme concentration which controls the rate. What is the expected order of the reaction?**

- A: 0
- B: 1
- C: 2
- D: 3

5. **A ______ order reaction has a rate proportional to the product of the concentration of two reactants, or to the square of the concentration of a single reactant.**

- A: Zero
- B: First
- C: Second
- D: Third

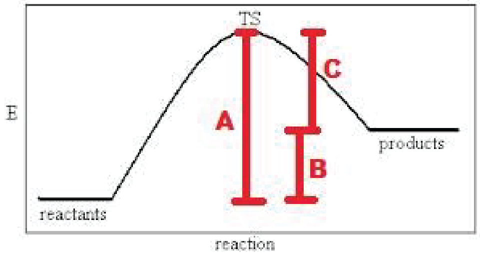
6. **For a first order reaction A -> B, the reaction rate at reactant concentration of 0.01 M is found to be 2.0×10^{-5} mol L^{-1} s^{-1}. The half life period of the reaction is?**

- A: 70
- B: 119
- C: 317
- D: 347

7. **For a general equation aA + bB ----------> cC + dD, the rate of reaction is given by? (assume that a, b, c, d are equal to the experimentally calculated values for a reaction)**

- A: $[A]^a [B]^b$
- B: $k [A]^a [B]^b$
- C: $[A]^a [B]^b / [C]^c [D]^d$
- D: $k [A]^a [B]^b / [C]^c [D]^d$

8. **Which of the following show the activation energy for the reaction path graph below?**



- A: A
- B: B
- C: C
- D: None of the above.

9. **What is the half life of a third order reaction if k = 1 and a = 0.2 M?**

- A: 5 s
- B: 7.5 s
- C: 25 s
- D: 37.5 s

10. **Which of the following is a pseudo first order reaction?**

- A: aA + bB ----> cC + dD with R = k [A] [B]
- B: aA + bB ----> cC + dD with $R = k [A]^b [B]^a$
- C: aA + bB ----> cC + dD with $R = k [A]^a [B]^b$
- D: aA + bB ----> cC + dD with R = k [A]

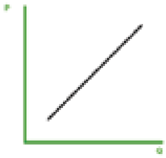
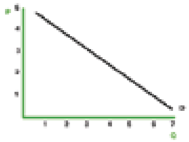
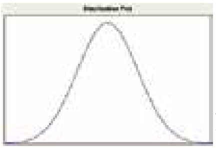
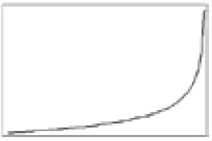
11. **Which of the following type of reaction would be the fastest one?**

- A: Oxidation
- B: Reduction
- C: Ionic
- D: Neutralization

12. **Keeping in mind the electrode potential, which one of the following reaction is possible?**

- A: Zn^{2+} + Cu --------> Cu^{2+} + Zn
- B: Zn + $MgSO_4$ -----------> $ZnSO_4$ + Mg
- C: Fe + $CuSO_4$ ------------> $FeSO_4$ +Cu
- D: Cd + $MgSO_4$ ----------> $CdSO_4$ + Mg

13. **By considering Arrhenius equation, the graph between "1/T" and "log k" gives a curve of the type:**

- A: logK  1/T
- B: log K  1/T
- C: log K  1/T
- D: log K  1/T

14. **For homogeneous catalysis reaction between liquids, the catalyst should be of which form?**

- A: Solid
- B: Liquid
- C: Gas
- D: Can be any of the above.

15. **Which of the following method is particularly suitable for measuring the rate of the reactions in solution?**

- A: Electrical conductivity method.
- B: Dilatometric method.
- C: Refractrometric method.
- D: Chemical method.

16. **Which of following method is used to measure the rate of reaction if only small changes in the volume are involved?**

- A: Dilatometric method
- B: Optical rotation method
- C: Chemical method
- D: Spectrometry

17. Ammonia can be produced acccording to the following reaction

$$N_2 + 3H_2 \overset{Fe_2O_3/Al_2O_3,K_2O}{\rightarrow} 2NH_3$$

In this reaction?

- A: Fe_2O_3 and AI_2O_3 are catalyst while K_2O is a promoter
- B: Fe_2O_3 is catalyst while Al_2O_3 and K_2O are promoters
- C: Al_2O_3 and K_2O are catalysts while AI_2O_3 is a promoter
- D: Fe_2O_3 and K_2O are catalysts while AI_2O_3 is a promoter

18. For a heterogeneous catalysis between gases, the catalyst could be of which form?

- A: Solid
- B: Liquid
- C: Gas
- D: Both A and B.

19. A reactant X is decomposed with a half life of 25 mins. If 0.1 mol/dm^3 of the reactant is present, what would be the remaining reactant after 100 mins?

- (selected) A: 0.00625 mol/dm^3
- B: 0.0125 mol/dm^3
- C: 0.025 mol/dm^3
- D: 0.05 mol/dm^3

20. Which of the following statements regarding the rate of reactions is true?

- A: Rate of reaction under given conditions (T, P) is always constant.
- B: Rate of reaction increases with time.
- C: Rate of reaction decreases with time.
- D: Under the constant concentrations of the reactants, the rate of reaction is constant.

Elements & Periodicity

TEST 1

1. Halides have three types: Ionic, covalent and?

- A: Amphoteric
- B: Intermediate.
- C: Polymeric
- D: Halides have only two types.

2. First Period contains how many elements?

- A: 1
- B: 2
- C: 8
- D: 18

3. Energy released or absorbed when electron is added to an element is known as?

- A: Ionization energy.
- B: Hydration energy
- C: Oxidation energy
- D: Electron affinity

4. Lower elements of group III A, IV A and V A are called?

- A: Metals
- B: Metalloids
- C: Transition elements
- D: Alkalis

5. After hydrogen and helium, the smallest element in the periodic table is?

- A: Cesium
- B: Fluorine
- C: Lithium
- D: Neon

6. Elements in the I A and II A subgroups are also called?

- A: p block elements
- B: s block elements
- C: d block elements
- D: f block elements

7. **Ionization energy is highest for which group of elements**?

- A: Alkali metals
- B: Alkaline earth metals
- C: Halogens
- D: Inert gases

8. The hydrides of Group I A are classified as?

- A: Ionic
- B: Covalent
- C: Intermediate
- D: Ionic except hydrogen.

9. Period 4 and 5 contain how many elements?

- A: 8
- B: 10
- C: 18
- D: 32

10. How many periods are there in the periodic table?

- A: 5
- B: 6
- C: 7
- D: 8

11. The atomic radius increases as we move down a group because ?

- A: Effective nuclear charge increases
- B: Atomic mass increases
- C: Added electrons are accommodated in new electron shells
- D: Atomic number increase

12. Which of the following groups have the greatest tendency to lose electron ?

- A: Group II A
- B: Group IV A
- C: Group V A
- D: Group VI A

13. All the elements in the group 1 A are metals except?

- A: H
- B: Li
- C: Na
- D: K

14. Elements with seven electrons in their valence shell are known as ?

- A: Inert
- B: Lanthanides
- C: Halogens
- D: Alkali metals

15. Mendeleev's Periodic table was based on ?

- A: Atomic number
- B: Atomic mass
- C: Atomic volume
- D: Electronic configuration

16. Elements of group I A are called?

- A: Alkaline earth metals
- B: Transition elements
- C: Rare earth metals
- D: Alkali metals

17. Charge that an element has in a compound is called?

- A: Ionization state
- B: Hydration state
- C: Affinity state
- D: Oxidation state

18. Mendleev's periodic table was based on ?

- A: Atomic number
- B: Atomic mass
- C: Atomic volume
- D: Electronic configuration

19. Law of octaves states that ?

- A: The properties of every 6^{th} element from the given one is similar to the first
- B: The properties of every 7^{th} element from the given one is similar to the first
- C: The properties of every 8^{th} element from the given one is similar to the first
- D: The properties of every 18^{th} element from the given one is similar to the first

20. Which one remain same along a period?

- A: Atomic radius
- B: Melting point
- C: Electrical conductance
- D: Number of shells (orbits)

TEST 2

1. How many elements have been discovered so far ?

- A: 90
- B: 102
- C: 110
- D: 118

2. Ionization energy within a group?

- A: Increases from the top to bottom
- B: Decreases from the top to bottom
- C: Remains same from the top to bottom.
- D: May increase or decrease from the top to bottom.

3. Elements which form basic oxides are?

- A: Electropositive
- B: Electronegative
- C: Inert
- D: None of these

4. Hydrogen has similar properties as of?

- A: Group IA
- B: Group IA or VIIA
- C: Group IA or IVA
- D: Group IA, IVA or VIIA.

5. Ionization energy depends on which of the following?
i. Magnitude of nuclear charge, ii. Size of atom, iii. Shielding effect

- A: iii only
- B: i and iii only
- C: ii and iii only
- D: i, ii and iii.

6. Radon is a _______ emitter and is used to treat _________?

- A: Beta, Kidney stone
- B: Alpha, Kidney stone
- C: Beta, Cancer
- D: Alpha, Cancer

7. When moving down the group in IA and IIA the electrical conductance?

- A: Increases
- B: Decreases
- C: Remains same
- D: There is no particular trend.

8. The lowest ionization energies are found in the?

- A: Inert gases
- B: Transition elements
- C: Alkaline earth metals
- D: Alkali metals

9. Which of the following elements would have more than one values of ionization energy?

i. Na, ii. Mg, iii. Al

- A: i only
- B: ii only
- C: ii and iii only
- D: i, ii and iii.

10. Which of the following pairs of elements are chemically most similar ?

- A: Na and AI
- B: O and S
- C: S and F
- D: B and N

11. Which orbital is responsible for valency in the transition elements?

- A: s block
- B: p block
- C: d block
- D: f block

12. Keeping in view the size of atoms, which order is incorrect?

- A: N>C
- B: P>Si
- C: Ar>Cl
- D: Li>Be

13. Melting points of group VII A elements _____ down the group ?

- A: Increase
- B: Decrease
- C: Remain constant
- D: No regular trend

14. Ionization energy is lowest for which group of elements?

- A: Inert gases
- B: Halogens
- C: Alkali metals
- D: Alkaline earth metals

15. More the ionization energy of an element :

- A: More the electropositivity.
- B: More the reducing power.
- C: Bigger the atomic radius.
- D: Less the metallic character.

16. From left to right in a period charge to size ratio of ions increases therefore the hydration energy ?

- A: Decreases
- B: Increases
- C: Remains constant
- D: Hydration energy has no relation with charge to size ratio.

17. The element with Z = 20 is placed in the period ?

- A: 2
- B: 3
- C: 4
- D: 5

18. Oxidation state of an atom represent ?

- A: No. of electrons gained
- B: No. of electrons lost
- C: No. of electrons gained or lost
- D: None of the above

19. The element with atomic number 7 is likely to have some properties to the element whose atomic number is?

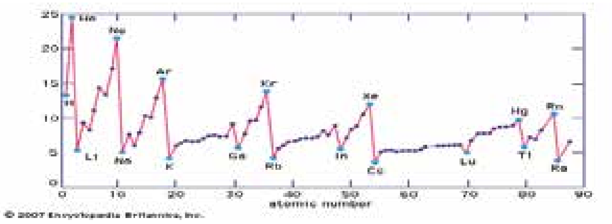
- A: 11
- B: 13
- C: 15
- D: 17

20. Elements present in a same group have the same ?

- A: Atomic number
- B: Molecular weight
- C: Chemical properties
- D: Number of electrons in the outermost shell

TEST 3

1. **The graph below is for which of the following physical properties of the elements? (Dots between two given elements show the elements in the same period)**



- A: Atomic radius
- B: Melting point
- C: Boiling point
- D: First ionization energy.

2. **Which of the following is not a characteristic of ionic hydrides?**

- A: They are crystalline solids.
- B: They have high melting points.
- C: They do not conduct electricity in any form.
- D: Both B and C.

3. **Which of the following has the highest first ionization energy?**

- A: Lithium
- B: Boron
- C: Carbon
- D: Oxygen

4. **Which of the following oxides is amphoteric in character ?**

- A: CaO
- B: CO_2
- C: NO_2
- D: BeO

5. **Most stable hydride is formed by?**

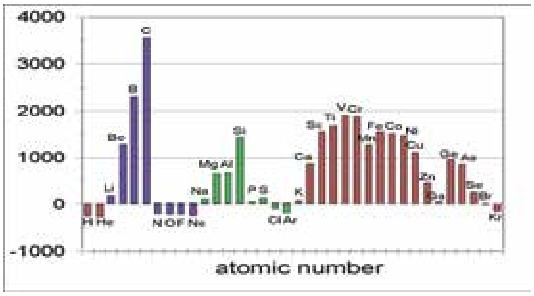
- A: Na
- B: K
- C: Mg
- D: F

6. Electron affinity depends on which of the following factors?

i. Size of the atom, ii. Nuclear charge, iii. Vacancies in the outermost shell

- A: iii only
- B: ii and iii only
- C: i and iii only
- D: i, ii and iii

7. The graph below is for which of the physical properties of elements?



- A: Atomic radius
- B: Ionization energy
- C: Melting points
- D: None of the above.

8. Which orbital is responsible for valency in Lanthanides and Actinides?

- A: s block
- B: p block
- C: d block
- D: f block

9. Which of the following statement is correct?

- A: All group II A oxides are basic in nature.
- B: Group VI A and VII A oxides are acidic in nature.
- C: All group III A oxides are amphoteric in nature.
- D: Both A and B.

10. Which of the following statement is not true?

- A: Positive ion is smaller in size as compared to the parent atom.
- B: Negative ion is smaller in size as compared to the parent atom.
- C: Ionic radius increase down the group.
- D: Within a period ionic raidus of positive ions decrease from left to right.

11. **Which of the following compound has the highest acidity?**

- A: MnO
- B: Mn_2O_3
- C: MnO_2
- D: Mn_2O_7

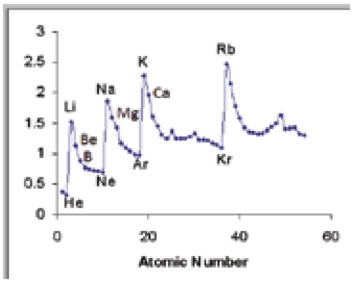
12. **What is the trend of melting and boiling points of the elements of short periods as we move from left to right in a periodic table?**

- A: Melting and boiling points decrease gradually
- B: Melting and boiling points first decrease then increase
- C: Melting and boiling points gradually increase
- D: Melting and boiling points first increase then deacrease

13. **Which of the following has strongest basic character ?**

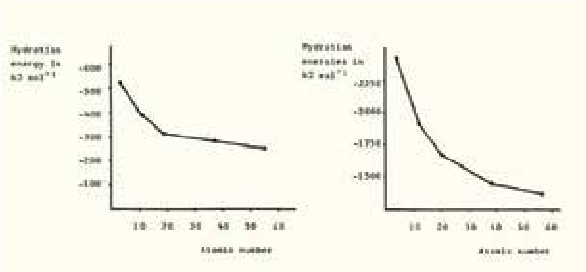
- A: P_2O_3
- B: AI_2O_3
- C: MgO
- D: Na_2O_3

14. **The graph below is for which of the physical properties of the elements?**



- A: Atomic radius
- B: Melting point
- C: Boiling point
- D: Ionization energy

15. The following graph shows hydration energy for?



- A: Elements within same group.
- B: Elements within same period.
- C: Transition elements.
- D: Metals.

16. Which one of the following has the smallest radius?

- A: Al^{+3}
- B: Si^{+4}
- C: Mg^{+2}
- D: Na^{+1}

17. Which halogen has the smallest electron affinity ?

- A: F
- B: CI
- C: Br
- D: I

18. Which of the following statement is correct?

- A: Metallic character remains same down the group.
- B: Metallic character decrease down the group.
- C: Metallic character increase along the period.
- D: Metallic character increase down the group.

TEST 4

1. Arrange the elements in trends of ionization energies?

- A: Ne<N<C<B
- B: B<N<C<Ne
- C: B<C<N<Ne
- D: Ne<B<C<N

2. The oxide of which of the following elements will be acidic in character ?

- A: Mg
- B: Rb
- C: S
- D: Na

3. If the radius of Na is 157 pm, which of the following is most likely to be the radius of Na^{+}?

- A: 95 pm
- B: 157 pm
- C: 200 pm
- D: 4000 pm

4. The outer most orbital involved in chemical bonding is called ?

- A: Molecular orbital
- B: Complete orbital
- C: Valence orbital
- D: Free orbital

5. Period 6 has how many elements?

- A: 8
- B: 10
- C: 18
- D: 32

6. Which of the following statement is correct?

- A: Energy is generally released when first the electron is absorbed by an element.
- B: Energy is generally absorbed when the first electron is absorbed by an element.
- C: Energy is may be absorbed or released when the first electron is absorbed by an element.
- D: Energy is generally released when the second electron is absorbed by an element.

7. **Which of the following has the maximum electron affinity ?**

- A: F
- B: Cl
- C: Br
- D: I

8. **Which of the following is sodium?**

- A: $^{11}X_{23}$
- B: $^{40}X_{19}$
- C: $^{26}X_{13}$
- D: $^{32}X_{16}$

9. **What is the symbol of the element with only 5 electrons and 5 protons ?**

- A: Li
- B: Be
- C: B
- D: N

10. **With increasing atomic number within a period, the electron affinity?**

- A: Increases
- B: Decreases
- C: Remains same
- D: None of the above.

11. **Along a period, atomic radius decreases. This gradual decrease in radius is due to;**

- A: Increase in number of shells
- B: Increase in number of electrons in valence shells
- C: Increase in number of protons in nucleus
- D: Decrease in number of shells

12. **Which of the following have chemically dissimilar elements?**

- A: Li and Na
- B: Mg and Ca
- C: F and Cl
- D: N and C

13. **All elements of group IIA form ionic hydrides except?**

- A: Be
- B: Mg
- C: Ca
- D: Both A and B

Group 1 To VI Elements

TEST 1

1. The elments of group I-A react violently with wtaer and make the solution?

- A: Neutral.
- B: Amphoteric.
- C: Acidic.
- D: Alkaline.

2. Which of the following have only one oxidation state?

- A: Transiton metals
- B: Halogens
- C: Alkali metals
- D: All of the above

3. An outer transition elements belong to:

- A: S-block
- B: P-block
- C: D-block
- D: F-block

4. Which electronic configuration corresponds to an element of group III-A of the periodic table?

- A: $1s^2 2s^2 2p^6 3s^2 3p^1$
- B: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
- C: $1s^2 2s^2 2p^6$
- D: $1s^2 2s^2 2p^6 3s^2 3p^3$

5. The least soluble alkaline earth metal hydroxide is?

- A: $Sr(OH)_2$
- B: $Ba(OH)_2$
- C: $Mg(OH)_2$
- D: $Be(OH)_2$

6. The milk of magnesia is used for the treatment of?

- A: Acidity
- B: Basicity
- C: Rancidity
- D: Jaundance

7. Which element is most abundant in the earth's crust?

- A: Iron
- B: Oxygen
- C: Silicon
- D: Carbon

8. Elements of group II-A are called alkaline earth metals due to the reason that?

- A: They occur in earth only.
- B: They form divalent cations only.
- C: They have ns^2 electronic configuration.
- D: Their oxides and hydroxides are alkaline in nature.

9. What is the nature of solution of borax?

- A: Neutral
- B: Alkaline
- C: Corrosive
- D: Acidic

10. Plaster of Paris is obtained from which of the following?

- A: Marble
- B: Bauxite
- C: Gypsum
- D: Lime stone

11. Oxidation of NO in the air produces?

- A: N_2O
- B: N_2O_3
- C: NO_2
- D: N_2O_5

12. Which one of the following is soda ash?

- A: $Na_2CO_3.2H_2O$
- B: $Na_2CO_3.10H_2O$
- C: Na_2CO_3
- D: $Na_2CO_3.H_2O$

13. Which one of the following is not an alkali metal?

- A: Francium
- B: Cesium
- C: Rubidium
- D: Radium

14. Slake lime is used in the manufacturing of which of the following?

- A: Plastics.
- B: Medicine
- C: Pigments
- D: Cement

15. Mortar is a mixture of?

- A: Lime, portland cement and water
- B: $MgCl_2$, tar and lime
- C: Slaked lime, plaster of paris and water
- D: Slaked lime, sand and water

16. Which catalyst is used in the contact process?

- A: Fe_2O_3
- B: V_2O_5
- C: SO_3
- D: Ag_2O

17. Lithium nitrate on heating gives?

- A: O_2
- B: $NO_2 + O_2$
- C: NO_2
- D: It is not decomposed on heating.

18. Which of the following compounds is formed when sodium burns in the excess of air?

- A: NaO_2
- B: Na_2O_2
- C: Na_2O
- D: Na_2O_3

19. Which one of the following reacts with haemoglobin of blood to form carboxyhaemoglobin?

- A: CO_2
- B: H_2O_2
- C: CO
- D: H_2

20. Down's cell is used to prepare which of the following?

- A: Sodium carbonate
- B: Sodium bicarbonate
- C: Sodium metal
- D: Epsom salt

TEST 2

1. Which is used as a filler for soap in the soap industry?

- A: Vitreous silica
- B: Sodium silicate
- C: Silica glass
- D: Aluminium silicate

2. Elements of group I-A colours in flame. It is due to their?

- A: Low melting point.
- B: Softness.
- C: Single electron in the outermost orbit.
- D: Low ionization potential.

3. When Na is dropped in water it catches fire due to the reason that?

- A: It is a metal.
- B: It is highly electropositive in nature.
- C: It has higher atomic mass.
- D: H_2 gas evolved in the reaction is combustible in nature.

4. Which one of the following gas will turn lime water milky?

- A: Cl_2
- B: NO_2
- C: CO
- D: CO_2

5. Which group of metals form a strong alkaline stable carbonate?

- A: Transition metals.
- B: Alkaline metal.
- C: Coing metal.
- D: Alkali metals.

6. O, S, Se and te are known as?

- A: Halogens
- B: Akali metals
- C: Chalogens
- D: Coinage metals

7. Which of the following is an amphoteric oxide?

- A: MgO
- B: BeO
- C: SrO
- D: CaO

8. Which of the following is true about the various allotropes of carbon?

- A: Coal is the hardest and coke is softest.
- B: Diamond is the hardest and coke is the softest.
- C: Graphite is the hardest and lamp black is the softest.
- D: Diamond is the hardest and graphite is the softest.

9. Alkali metals are included in the category of?

- A: Noble gases
- B: Transition elements
- C: Representative elements
- D: Inner transition elements

10. The general name of the ore $CaSO_4.2H_2O$ is?

- A: Gypsum
- B: Dolomite
- C: Calcite
- D: Epsom salt

11. Which of the following carbonates decompose on moderate heating?

- A: Rb_2CO_3
- B: Li_2CO_3
- C: Na_2CO_3
- D: K_2CO_3

12. How does boron differ from the other members of group III-A?

- A: It has maximum valency of six.
- B: It has much lesser radius.
- C: It is a non-metal.
- D: It is not covalent in its compounds.

13. Which of the following elements exhibit maximum catenation property?

- A: C
- B: Pb
- C: Ge
- D: Sn

14. The most dense element in the choices below is:

- A: Li
- B: K
- C: Ca
- D: Ba

15. Gold dissolves in aqua regia to give which of the following?

- A: Aurmchloric acid.
- B: Auric chloride.
- C: Aurous nitrate.
- D: Aurous chloride.

16. Which one of the following oxides of nitrogen is a brown coloured gas?

- A: N_2O_5
- B: N_2O
- C: N_2O_3
- D: NO_2

17. The catalyst used in the Haber's process is:

- A: Iron catalyst with metal oxide promoters
- B: Magnesium oxide
- C: Aluminium oxide
- D: Silicon dioxide

18. The brown gas formed when metal reduces concentrated $HNO_3$is?

- A: N_2O_5
- B: N_2O_3
- C: NO_2
- D: NO

19. N_2 molecule is less reactive due to which of the following reasons?

- A: High electronegativity.
- B: Stable electronic configuration.
- C: High dissociation energy.
- D: Small atomic radius.

20. BF_3 acts as lewis acid because it behaves as?

- A: Free radical
- B: Cationic species
- C: Electrophile
- D: Nucleophile

TEST 3

1. What is the molecular formula of white phosphorous?

- A: P_4
- B: P
- C: P_3
- D: P_2

2. Which of the following metals gives NO with HNO_3?

- A: Fe
- B: Zn
- C: Cu
- D: Sn

3. Which of the following is obtained by heating H_3PO_4 to 600ºC?

- A: $P_2O_5 + 3H_2O$
- B: H_3PO_5
- C: HPO_3
- D: $H_4P_2O_7$

4. In the Down's cell $CaCl_2$ is added to NaCl to achieve which of the following?

- A: Increase the solubility.
- B: Increase the dissociation.
- C: Increase conductivity.
- D: Lower melting point.

5. Basic lead chromate is formed when lead chromate is boiled with which of the following?

- A: Dilute alkali hydroxide.
- B: Dilute acid.
- C: Strong alkali hydroxide.
- D: Strong acid.

6. What is the final product of hydrolysis of P_2O_3?

- A: $(PHO_3)n$
- B: H_3PO_3
- C: $H_6P_4O_{13}$
- D: H_3PO_4

7. Diamond is hard because?

- A: It has a high value of refractive index.
- B: All the valence electrons of each C-atom are involved in the bonding.
- C: It is a giant molecule.
- D: It is a crystalline allotrope of carbon.

8. **Which one of the following elements is most electropositive out of group I-A and II-A group?**

- A: K
- B: Mg
- C: Na
- D: Ca

9. **Which of the following is sylvite?**

- A: KCl
- B: Na_2SO_4
- C: $NaNO_3$
- D: KNO_3

10. **Which of the following metal hydroxides decompose on heating?**

- A: $Be(OH)_2$
- B: $Mg(OH)_2$
- C: $Ca(OH)_2$
- D: All except A.

11. **Which of the following gas burns with a blue flame?**

- A: CO_2
- B: NO
- C: N_2
- D: CO

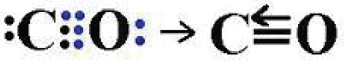
12. **Which of the following is the formula of metaphosphoric acid?**

- A: $H_4P_2O_7$
- B: H_2PO_3
- C: H_3PO_4
- D: HPO_3

13. **Which of the following does not give flame test?**

- A: Li
- B: Ba
- C: Mg
- D: Sr

14. **The electronic structure of carbon monoxide is reresented as:**

- A:
- B: 
- C:

- D: **C=O**

15. Which of the following does not form an oxide on heating?

- A: KNO_3
- B: Na_2CO_3
- C: Li_2CO_3
- D: $CaCO_3$

16. The solubility of akaline metal hydroxide?

- A: Increases down the group
- B: Decreases down the group
- C: Remain same through out the group
- D: First increase then decrease down the group

17. Which compound gives carbon with conc. H_2SO_4 ?

- A: Starch
- B: Ethyl alcohol
- C: Oxalic acid
- D: Copper

18. The chemical formula of magnesite is?

- A: $CaMg_3(SiO_3)_4$
- B: $MgCl_2$
- C: $MgCO_3$
- D: $MgSO_4$

19. Orthoboric acid when heated to red hot gives?

- A: Boric anhydride.
- B: Pyroboric acid.
- C: Metaboric acid.
- D: Tetraboric acid.

20. Inert pair effect is observed when?

- A: Non-metallic character decreases.
- B: The ns^2 electrons remain inert and do not take part in bonding.
- C: A bond pair of electrons is present in the element
- D: An element shows inertness in chemical combination.

TEST 4

1. The main constituent of teeth is?

- A: $Ca_3(PO_4)_2$
- B: $CaSO_4$
- C: $CaCO_3.MgCO_3$
- D: $CaCO_3$

2. What is the general electronic configuration of VI-A group elements?

- A: ns^2np^4
- B: ns^2np^3
- C: ns^2np^2
- D: ns^2np^5

3. Which of the following properties is more applicable to alkaline earth metals as compared with alkali metals?

- A: Lower electro negativities.
- B: Less basic hydroxides.
- C: Lower ionization potentials.
- D: Large ionic radii.

4. Alkaline earth metal hydroxide decompose on heating. Which of the following of the following reactions is the correct representation of decomposition:

- A: $MOH \text{ ---> } M_2O + H_2O_{(G)}$
- B: $M(OH)_2\text{---> } MO + H_2O_{(G)}$
- C: $2MOH \text{ ---> } 2MO + H_{2(G)}$
- D: $4MOH \text{ ---> } 4M + 2H_2O_{(G)} + O_{2(G)}$

5. Which is the most important by bi-product formed in the manufacture of NaOH through Nelson Cell method?

- A: Na_2CO_3
- B: Cl_2
- C: KOH
- D: K_2CO_3

6. What are the products for hydrolysis of PCl_3?

- A: $H_3PO_4 + HCl$
- B: $PH_3 + HClO$
- C: $H_3PO_3 + HClO$
- D: $H_3PO_3 + HCl$

7. Point out the ore of potassium amongst the following?

- A: Dolomite
- B: Cryolite
- C: Bauxite
- D: Carnallite

8. What is the common name for $MgSO_4.7H_2O$?

- A: Carnallite
- B: Dolomite
- C: Beryl
- D: Epsom salt

9. Which of the following metal carbonates are stable towards heat?

- A: Alkali
- B: Alkaline
- C: Both of the above
- D: None of the above

10. Which of the following is the starting material in Brikland Eyde's process for creating nitric acid?

- A: Chile saltpeter
- B: Ammonia NO_2
- C: $NO_2 + NH_3$
- D: Air

11. In alkaline earth metals, the electrons are more firmly held to the nucleus and hence?

- A: They should be highly reactive.
- B: Radii of alkaline earths are bigger than alkali metals.
- C: Reactivity of alkaline earths is greater than alkali metals.
- D: Ionization energy of alkaline earths is greater than alkali metals.

12. When sugar is treated with conc. H_2SO_4 the sugar becomes black due to?

- A: Decolourization
- B: Dehydration
- C: Hydrolysis
- D: Hydration

13. Which of the following shown moderate electrical conductivity?

- A: Carbroundum.
- B: Diamond.
- C: Graphite.
- D: Silica.

14. Which one of the following hydroxide is insoluble in water?

- A: LiOH
- B: KOH
- C: $Be(OH)_2$
- D: $Ba(OH)_2$

15. The general electronic configuration of group IV-A elements is?

- A: ns^2np^6
- B: ns^2np^4
- C: ns^2np^3
- D: ns^2np^2

16. The oxide of boron B_2O_3 is?

- A: Ionic
- B: Basic
- C: Amphoteric
- D: Acidic

17. Chemical composition of colemanite is?

- A: $Ca_2B_6O_{11}.5H_2O$
- B: CaB_4O_7
- C: $Na_2B_4O_7.4H_2O$
- D: $CaNaB_5O_9.8H_2O$

18. What is chemical formula of red lead?

- A: Pb_2O_3
- B: Pb_3O_4
- C: PbO
- D: Pb_2O

19. Which of the following is Natron / crystal carbonate?

- A: $Na_2CO_3.10H_2O$
- B: $Na_2CO_3.H_2O$
- C: $NaHCO_3$
- D: NaOH

20. Which of the following hydroxides is the weakest base in the given list?

- A: RbOH
- B: NaOH
- C: LiOH
- D: KOH

Halogens & Nobel Gases

TEST 1

1. Which of the following is colourless volatile liquid?

- A: HF
- B: HCl
- C: HBr
- D: HI

2. Which of the following is the strongest acid?

- A: HClO
- B: $HClO_2$
- C: $HClO_3$
- D: $HClO_4$

3. Bleaching powder is used for which of the following?

- A: For making unshrinkable wool.
- B: In sterilization of water.
- C: As a disinfectant.
- D: All of the above.

4. Noble gases do not react with other elements because?

- A: The sizes of their atoms are very small.
- B: They have completely paired up and stable electron shells.
- C: They are not found in abundance.
- D: They are monoatomic.

5. The strongest halogen acid is?

- A: HF
- B: HBr
- C: HCl
- D: HI

6. Which of the following halogens is purified by sublimation?

- A: Fluorine
- B: Chlorine
- C: Iodine
- D: Bromine

7. Which of the following is used as a non stick coating for cooking pans?

- A: Teflon
- B: Freon
- C: Argon
- D: Krypton

8. Photographic plates are coated with a film of which of the following?

- A: $AgNO_3$
- B: $AgBr$
- C: $AgCl$
- D: AgI

9. Which of the following is used in the bactericidal lamps?

- A: Rn
- B: Ar
- C: Kr
- D: Xe

10. $CaOCl_2$ acts as a bleaching agent only in the presence of?

- A: Pure O_2
- B: Dry air
- C: Moisture
- D: Sunlight

11. Which of the following shows the electronic configuration of the outer most shell of the halogens?

- A: ns^2np^5
- B: ns^1np^6
- C: ns^2np^1
- D: ns^3np^4

12. When Cl_2 is passed over dry slaked lime, the main product is?

- A: $Ca(OCl_2)_2$
- B: $CaOCl_2$
- C: $CaClO_2$
- D: $Ca(ClO_2)_2$

13. Hydrogen halides acts as a reducing agent in which order?

- A: $HF<HCl<HBr<HI$
- B: $HF>HCl>HBr>HI$
- C: $HF<HBr<HCl<HI$
- D: $HF>HBr>HCl>HI$

14. What is the order of decreasing oxidation power in halogens?

- A: $F_2 > Cl_2 > Br_2 > I_2$
- B: $F_2 < Cl_2 < Br_2 < I_2$
- C: $F_2 > Br_2 > Cl_2 > I_2$
- D: $F_2 < Br_2 < Cl_2 < I_2$

15. Bleaching powder is prepared through which of the following process/es?

- A: Hasenclever's method
- B: Beckmann's method
- C: Landberger's method
- D: Both A and B.

16. Which of the following halogen is used as a germicide?

- A: I_2
- B: F_2
- C: Br_2
- D: All of the above.

17. What is the formula of teflon?

- A: $CCl_3.F_2$
- B: $(C_2F_4)_n$
- C: $(CF_2.CCl)_n$
- D: $CCl_3.F$

18. Which of the following halogens react with hot and cold NaOH to give different reaction?

- A: Cl_2
- B: Br_2
- C: I_2
- D: F_2

19. Which of the following halogens is solid at room temperature?

- A: I_2
- B: Br_2
- C: F_2
- D: Cl_2

20. For the prediction of earth quakes which of the following gas is used?

- A: Ne
- B: Ar
- C: Kr
- D: Rn

TEST 2

1. Which of the following is used in radiotherapy?

A: Rn

B: Xe

C: Kr

D: Ar

2. "Available chlorine" is the chlorine liberated by the action of?

A: Excess of dilute acid on the bleaching powder.

B: A drop of dilute acid on bleaching powder.

C: Zn dust and HCl.

D: MnO_2 on hot conc.HCl.

3. The anhydride of $HClO_4$ is?

A: ClO

B: ClO_2

C: ClO_3

D: Cl_2O_7

4. Which of the following statement is not correct?

A: The most electronegative halogen is flourine.

B: The most reactive halogen is flourine.

C: The strongest oxidizing halogen is iodine.

D: A halogen which is liquid at room temperature is bromine.

5. The acidic strength increase of halogens acid in which order?

A: $HF<HCl<HBr<HI$

B: $HF<HBr<HCl<HI$

C: $HF>HCl>HBr>HI$

D: $HF>HBr>HCl>HI$

6. HF can not be preserved in a glass bottles because?

A: It reacts with aluminium oxide of the glass

B: It reacts with silica of the glass

C: It reacts with the visible part of glass

D: It reacts with the sodium oxide of glass

7. Which of the following is used in the Geiger counters?

- A: Xe
- B: Ar
- C: Kr
- D: Ne

8. Hydrogen bond is strongest in which of the following hydrogen halide?

- A: HF
- B: HCl
- C: HBr
- D: HI

9. Which of the following displace Br_2 from an aqueous solution containing Br^- ion?

- A: I_2
- B: Cl_2
- C: Cl^-
- D: I_3^-

10. Which one of the following oxyacids of fluorine exists?

- A: HFO_4
- B: HFO_3
- C: HFO
- D: All of the above.

11. Iodine deficiency in the diet is known to cause which of the following disease?

- A: Beri-beri
- B: Night blindness
- C: Goiter
- D: Rickets

12. With an increase of atomic number of the halogens, they?

- A: Lose the outermost electrons less readily.
- B: Gain electrons less readily.
- C: Become less denser.
- D: Become lighter in colour.

13. Which one of the following provides an inert environment for welding?

- A: Carbon dioxide
- B: Neon
- C: Helium
- D: Krypton

14. One of the products of the reaction between solid $KMnO_4$ and conc.HCl is?

- A: $HClO_4$
- B: MnO_2
- C: A red liquid
- D: A greenish yellow gas

15. Which of the following hydrogen halide is the weakest acid in solution?

- A: HF
- B: HBr
- C: HI
- D: HCl

16. The strongest reducing agent in the list below is?

- A: HBr
- B: HI
- C: HF
- D: HCl

17. In which method counter-current principle is used to prepare the bleaching powder?

- A: Beckmann's method
- B: Hasenclever's method
- C: Landerson's method
- D: None of the above

18. Considering the atomicity of noble gases, they are?

- A: Diatomic
- B: Triatomic
- C: Monoatomic
- D: Any of the above

19. The shape of ClO_4^- is?

- A: Linear
- B: Pyramidal
- C: Angular
- D: Tetrahedral

20. Which of the following represents the correct configuration of the outermost energy level of an element of zero group in the ground state?

- A: s^2p^2
- B: s^2p^4
- C: s^2p^5
- D: s^2p^6

Test 3

1. **Which among the following is the most polarized noble gas?**

   - A: Kr
   - B: Ar
   - C: Xe
   - D: He

2. **The structure of XeF_2 molecule is?**

   - A: Tetrahedral
   - B: Trigonal planar
   - C: Pyramidal
   - D: Linear

3. **Iodine is most soluble in the solution of?**

   - A: $KMnO_4$
   - B: H_2O
   - C: KI
   - D: KOH

4. **Fluorine is a better oxidizing agent than Br_2 because of its:**

   - A: Small size.
   - B: More electron-electron repulsion.
   - C: Non-metallic nature.
   - D: Higher electro negativity.

5. **Whic of the following halogen acids can be obtained by the action of concentrated sulphuric acid on halides?**

   - A: HF
   - B: HBr
   - C: HI
   - D: All of the above

6. **Which of the following is a paramagnetic oxide of chlorine?**

   - A: Cl_2O_7
   - B: Cl_2O_6
   - C: ClO_4
   - D: ClO_2

7. **For bleaching powder which of the following is incorrect?**

   - A: Reacts with dilute acid to release Cl_2.
   - B: Light yellow colored powder.
   - C: Highly soluble in water.
   - D: Oxidizing agent.

8. The oxy acids of halogens show their strength in the order?

- A: $HXO>HXO_2>HXO_3>HXO_4$
- B: $HXO<HXO_2<HXO_3<HXO_4$
- C: $HXO<HXO_3<HXO_2<HXO_4$
- D: $HXO_4>HXO_2>HXO_3>HXO$

9. Which halogen has the maximum number of oxides?

- A: I_2
- B: Br_2
- C: Cl_2
- D: F_2

10. Which of the following is the strongest acid in all aqueous medium?

- A: Hypochlorous acid
- B: Chloric acid
- C: Perchloric acid
- D: Halic acid

11. The halogen which forms of compounds with Xe is?

- A: F
- B: Cl
- C: Br
- D: I

12. Which one of the following reasons makes the halogens volatile in nature?

- A: Halogen molecules are more reactive.
- B: The forces existing between the discrete molecules are only weak Van der Waal's forces.
- C: Halogen molecules are bound by strong forces.
- D: Halogen molecules are bounded by electrostatic forces.

13. The noble gas forming maximum number of compounds is?

- A: Rn
- B: Xe
- C: Ne
- D: Kr

14. Which of the following oxides of halogens have low thermal stability?

- A: Oxides of fluorine
- B: Oxides of chlorine
- C: Oxides of bromine
- D: Oxides of iodine

15. Thermally the most stable oxyacid of chlorine is?

- A: $HClO_4$
- B: $HClO_3$
- C: $HClO$
- D: $HClO_2$

16. Which of the following does not increase from HCl to HI?

- A: Heat of formation.
- B: Dipole moment.
- C: Heat of fusion.
- D: Melting point.

17. Which of the following halogen acid in gaseous state is found as a equilibrium mixture of manomers and hexamers?

- A: HF
- B: HCl
- C: HBr
- D: HI

18. The weakest oxyacid of chlorine is?

- A: $HClO_2$
- B: $HClO_3$
- C: $HClO_4$
- D: $HClO$

19. Chlorine heptaoxide Cl_2O_7 reacts with water to form?

- A: Hypochlorous acid
- B: Chloric acid
- C: Perchloric acid
- D: Chlorine and oxygen

Test 4

1. **Which of the following halogen is used in the preparation of the herbicides?**

- A: F_2
- B: Cl_2
- C: Br_2
- D: I_2

2. **Which silver salt is fairly soluble in water?**

- A: AgF
- B: AgBr
- C: AgCl
- D: AgI

3. **Which of the following is formed when NaOH reacts with Cl_2 in the cold state?**

- A: $NaClO_4$
- B: $NaClO_3$
- C: NaClO
- D: $NaClO_2$

4. **Which of the following halogen is used as a disinfectant?**

- A: Chlorine
- B: Bromine
- C: Iodine
- D: Flourine

5. **Indicate the correct statement?**

- A: Cl_2 is the strongest oxiding agent.
- B: I_2 is a volatile solid.
- C: Br_2 is more reactive than Cl_2.
- D: Cl_2 is insoluble in water.

6. **Which of the following is the radioactive element of group VII-A?**

- A: Br
- B: Cl
- C: F
- D: At

7. **Flourine does not show positive oxidization state due to the absence of?**

- A: p-orbitals
- B: d-orbitals
- C: s-orbitals
- D: f-orbitals

8. The acid employed for the etching of the glass is?

- A: Aqua regia
- B: HF
- C: $HClO_4$
- D: H_2SO_4

9. Which of the following halogens is most easily reduced?

- A: I_2
- B: Br_2
- C: Cl_2
- D: F_2

10. What is the colour of I_2 in CCl_4?

- A: Colourless
- B: Bluish green
- C: Brown
- D: Violet

11. Which one of the following halogens is present in teflon?

- A: I_2
- B: Br_2
- C: Cl_2
- D: F_2

12. Oxidizing power of halogens depends on which of the following factors?

- A: Energy of dissociation.
- B: Electron affinity of atoms.
- C: Hydration energies of ion.
- D: All of the above.

13. Which one of the following oxyacids is the strongest oxidant?

- A: $HClO_3$
- B: $HClO$
- C: $HClO_4$
- D: $HClO_2$

14. In the preparation of Cl_2 from HCl, MnO_2 acts as?

- A: Reducing agent
- B: Dehydrating agent
- C: Oxidizing agent
- D: Catalytic agent

15. Which of the following halides are used in the toothpastes?

- A: Iodides
- B: Bromides
- C: Chlorides
- D: Fluorides

16. Bleaching powder is not used for which of the following?

- A: As a reducing agent.
- B: For manufacture of chloroform.
- C: As a disinfectant and germicide.
- D: For bleaching cotton, wood pulp etc.

17. Fluorine is largely used in?

- A: Rocket fuels.
- B: Making teflon.
- C: Making feron.
- D: All of the above.

18. Noble gas compounds are more common is xenon due to its?

- A: Zero electrons affinity.
- B: Structure.
- C: Higher ionization potential.
- D: Lower ionization potential.

19. Which of the following halogen is liquid at room temperature?

- A: Fluorine
- B: Chlorine
- C: Bromine
- D: Iodine

20. Which of the following is not a use of helium?

- A: In weather ballons.
- B: In welding.
- C: As cooling medium for nuclear reactor.
- D: In flourescent tubes.

Transition Elements

TEST 1

1. Which of the following is also known as pig iron?

- A: Impure sulphide ore of iron.
- B: Alloy of steel.
- C: Wrought iron.
- D: Cast iron.

2. An atom or molecule having partially filled orbitals show which of the following behavior?

- A: Ferromagnetism.
- B: Paramagnetism.
- C: Diamagnetism.
- D: None of the above.

3. There are four orbitals s,p,d and f. which order is correct with respect to increasing energy of the orbitals?

- A: $4s<4p<4d<4f$
- B: $4s<4f<4p<4d$
- C: $4f<4p<4d<4s$
- D: $4s<4d<4p<4f$

4. A complex compound may contain which of the following?

- A: A simple cation and a complex anion.
- B: A complex cation and a simple anion,
- C: Both of the above.
- D: None of the above.

5. The number of lone pair of electrons provided by the ligand to the central atom or ion the complex is called?

- A: Coordination number.
- B: Coordination sphere.
- C: Chelate number.
- D: Ligand number

6. Which of the following elements can be adsorb in interstics of transition elements?
i. Hydrogen, ii. Carbon, iii. Nitrogen

- A: i only.
- B: i and ii only
- C: ii and iii only.
- D: i, ii and iii.

7. Transition of electrons from 'd to d' orbitals gives which property to the transition elements?

- A: Paramagnetism
- B: Variable oxidation state
- C: Colour
- D: Interstitial compounds

8. 3-d series elements are present in?

- A: Third period
- B: Fourth period
- C: Fifth period
- D: Sixth period

9. Coordination sphere can be which of the following?

- A: Cationic
- B: Anionic
- C: Neutral
- D: All of the above

10. d-block elements are also called?

- A: Alkali metals
- B: Alkaline earth metals
- C: Transition elements
- D: Electron deficient elements

11. Non-typical transition elements belong to which series?

- A: I-A and II-A
- B: II-A and II-B
- C: II-B and III-B
- D: III-B and III-A

12. Which of the following has the lowest percentage of carbon?

- A: Wrought iron
- B: Cast iron
- C: Steel
- D: All have same percentage

13. Identify ligand in the complex $[Ag(NH_3)_2]Cl$?

- A: Ag
- B: NH_3
- C: Cl
- D: There is no ligand.

14. Bessemer converter is used in the manufacturing of which of the following?

- A: Steel.
- B: Wrought iron.
- C: Cast iron.
- D: Pig iron.

15. f-block elements are also called?

- A: Outer transition elements
- B: Inner transition elements
- C: Transition elements
- D: Chalcogens

16. The half life of N_2O_5 is 24 minutes. How long will it take for such sample to decay to 25% of its original composition?

- A: 24mins
- B: 72mins
- C: 120mins
- D: 48mins

17. Group III-B series transition elements have how many electrons in the d-orbitals?

- A: One
- B: Two
- C: Three
- D: Four

18. Zn,Cd and Hg belongs to which series?

- A: I-B
- B: II-B
- C: III-B
- D: IV-B

19. d-block elements are called?

- A: Outer transition elements
- B: Inner transition elements
- C: Transition elements
- D: C-halogens

Test 2

1. Variable valency can not be shown by Zn because?

- A: It is soft.
- B: Its d-subshell is complete.
- C: It has only two electrons in the outermost orbit.
- D: Its d-subshell is incomplete.

2. 6d-series is in which period?

- A: 4^{th}
- B: 5th
- C: 6^{th}
- D: 7^{th}

3. $[Ti(H_2O)_6]^{+3}$ absorbs which wavelength of light?

- A: Yellow
- B: Red
- C: Blue
- D: Both a and b

4. Choose the correct statement:

- A: Chelates are more stable than ordinary complex
- B: Complexes are more stable than ordinary Chelates
- C: Monodentate ligand form chelate
- D: Chelates have no ring structure

5. One of the following property of transition elements vary with a regular parttern. Indicate that:

- A: Binding energy
- B: Covalent radius
- C: Cationic radius
- D: Oxidation state

6. Which of the following cations has maximum unpaired electrons?

- A: Ni^{2+}
- B: Co^{2+}
- C: Mn^{2+}
- D: Fe^{2+}

7. Amongst the following ions, which has the highest paramagnetism?

- A: $[Cr(H_2O)_6]^{+3}$
- B: $[Fe(H_2O)_6]^{+2}$
- C: $[Cu(H_2O)_6]^{+2}$
- D: $[Zn(H_2O)_6]^{+2}$

8. High temperature is maintained in the open hearth furnace by using?

- A: Methane gas.
- B: Water gas.
- C: Oil gas.
- D: Producers gas.

9. Oxidation state of "Fe" in $K_3[Fe(CN)_6]$ is:

- A: +2
- B: -6
- C: -3
- D: +3

10. Oxidation state of "Mn" in $KMnO_4$, K_2MnO_4, MnO_2 and $MnSO_4$ is in order:

- A: +7,+6,+2,+4
- B: +6,+7,+2,+4
- C: +4,+6,+7,+2
- D: +7,+6,+4,+2

11. Why Cr and Cu have half filled s-orbitals?

- A: They belong to s-block elements.
- B: They are alkali metals.
- C: This gives stability to d-orbitals.
- D: They are alkaline earth metals.

12. Typical transition elements are transition elements except which groups?

- A: I-A and II-A
- B: II-A and II-B
- C: II-B and III-B
- D: III-A and III-B

13. Which pair of transition elements show abnormal electronic configuration?

- A: Sc and Zn
- B: Cu and Sc
- C: Cu and Cr
- D: Zn and Cu

14. Which transition element has the highest melting point?

- A: Zn
- B: Co
- C: V
- D: W

15. Maximum paramagnetism is present in?

- A: Fe^{3+}
- B: Mn^{2+}
- C: Fe^{3+} and Cu^{2+}
- D: Both a and b

16. The oxidation number of Cr in $K_2Cr_2O_7$ is?

- A: +5
- B: +6
- C: +3
- D: Zero

17. Which of the following is typical transition metal?

- A: Sc
- B: Y
- C: Hg
- D: Co

18. Which of the following statement is correct?

- A: Sc belong to 5d series.
- B: Co belong to 4d series.
- C: Zn belongs to f-block of the periodic table.
- D: Fe belongs to 3d series.

19. Binding energies of the transition elements are?

- A: Weak
- B: Strong
- C: Very weak
- D: Depends on the series.

20. The ability of transition elements to form complexes is due to?

- A: Small size metal ion.
- B: Highly charged metal ion.
- C: Availability of empty d and f orbitals.
- D: All of the above.

Test 3

1. Bessemer converter in the manufacture of steel from cast iron containing impurity of P is lined with which of the following?

A: $FePO_4$

B: Fe_2O_3

C: SiO_2

D: CaO

2. The outer electronic configuration of an atom is $3d^6 4s^2$. The atom is?

A: Iron

B: Zinc

C: Magnese

D: Copper

3. The charge in open hearth process consists of which of the following?

A: Scrap iron.

B: Fe_2O_3.

C: Cast iron.

D: All of the above.

4. Which element pair is although the transition elements, yet have half filled s-orbitals?

A: Cu and Co

B: Co and Cr

C: Cu and Cr

D: Zn and Cr

5. In the complexes, square planar geometry is given by which type of hybridization in the valence shell of central metal atom?

A: sp^3

B: dsp^3

C: d^2sp^3

D: dsp^2

6. The highest oxidation state of Mn is present in which of the following compounds?

A: K_2MnO_4

B: $KMnO_4$

C: MnO

D: MnO_2

7. The trace metal present in insulin is?

A: Mn

B: Co

C: Fe

D: Zn

8. Transition elements have which of the following property(ies)?

- A: Pure metals.
- B: Complex formation.
- C: Alloys formation.
- D: All of the above.

9. Which of the following elements has zero binding energy?

- A: Zn
- B: Co
- C: V
- D: W

10. Anhydrous cobalt (II) chloride-3 is blue in colour but on dissolving it in water changes to pink in colour because?

- A: Its oxidation state changes.
- B: Its magnetic character changes,
- C: Its co-ordination number changes.
- D: In water it shows flourescence.

11. Number of ligands in the trigonal bypyramidal geometry of complexes are?

- A: 3
- B: 4
- C: 5
- D: 6

12. Which transition element has the maximum binding energy?

- A: Zn
- B: Co
- C: V
- D: W

13. A property which includes the II-B series in the transition elements is?

- A: They make complexes.
- B: They are pure metals.
- C: They have partially filled d-orbitals.
- D: They show transition properties in compound state.

14. Which of the following is the function of both $K_2Cr_2O_7$ and $KMnO_4$?

- A: Oxidizing agent.
- B: Germicide.
- C: Chrome tanning.
- D: All of the above.

15. **Group VI-B of transition elements contains?**

- A: Zn,Cd,Hg
- B: Fe,Ru,Os
- C: Cr,Mo,W
- D: Mn,Te,Re

16. **Co-ordination number of Pt in $[PtCl(NO_2)(NH_3)_4]^{2-}$ is:**

- A: -2
- B: +4
- C: +1
- D: +6

17. **When Pig iron is cooled slowly, grey cast iron is formed in which carbon is present as which of the following?**

- A: Graphite
- B: Coal
- C: Cemenite
- D: CaC_2

18. **The lowest oxidation state of Fe is in which of the following compounds?**

- A: Mohr's salt
- B: Fe_2O
- C: $K_4Fe(CN)_6$
- D: $Fe(CO)_5$

19. **Which is the electronic configuration of Cr?**

- A: $3d^4 4s^2$
- B: $3d^5 4s^1$
- C: $3d^6 4s^1$
- D: $3d^1 4s^{11}$

20. **Electronic configuration of gold [Au_{79}] is ?**

- A: [Xe] $4f^{14}$,$5d^{10}$,$6s^1$
- B: [Xe] $4f^{10}$,$5d^{10}$,$6s^2$
- C: [Xe] $4f^{14}$,$5d^9$,$6s^2$
- D: [Xe] $4f^{14}$,$5d^{10}$,$6s^2$

Test 4

1. All chromates mostly have which color?

- A: Deep red
- B: Yellow
- C: Bluish green
- D: White

2. An atom or molecule with all completely filled orbital's show which of the following behavior?

- A: Ferromagnetism
- B: Paramagnetism
- C: Diamagnetism
- D: None of the above

3. Which has least melting point among the given list?

- A: Zn
- B: Co
- C: V
- D: W

4. Which period starts from $_{17}Sc$ to $_{30}Zn$?

- A: Sixth period
- B: Fifth period
- C: Fourth period
- D: Third period

5. Pure $KMnO_4$ exists in the form of?

- A: A white solid.
- B: Pale yellow liquid.
- C: Dark purple lustrous crystal.
- D: Brown powder.

6. A property(ies) which differentiate the interstitial compounds from true compounds is (are)?

- A: Non-stoichiometric ratio.
- B: No true bond.
- C: No whole number ratio .
- D: All of the above.

7. $[Ti(H_2O)_6]^{+3}$ transmits which light:

- A: Yellow and red
- B: Yellow and blue
- C: Red and white
- D: Red and Blue

8. Puddling process is used in the manufacturing of which of the following?

- A: Wrought iron
- B: Cast iron
- C: Steel
- D: Pig iron

9. The presence of H^+ in equilibrium solution of chromate and dichromate ions favours which of the following?

- A: $Cr_2O_7^{-2}$
- B: CrO_4^{-2}
- C: $Cr_2O_5^{-3}$
- D: Equilibrium is maintained.

10. Acidified $KMnO_4$ acts as?

- A: Red agent
- B: Excellent precipitating reagent
- C: Oxidizing agent.
- D: Reducing agent.

11. The percentage of carbon in different types of iron products is in the order of?

- A: Cast iron>Wrought iron>Steel
- B: Wrought iron>Steel>Cast iron
- C: Cast iron>Steel>Wrought iron
- D: Cast iron=Steel>wrought iron

12. Which of the following transition elements has the maximum ferromagnetic character?

- A: Pt
- B: Co
- C: Fe
- D: Ni

13. The first transition series ends on the element?

- A: Scandium
- B: Cadmium
- C: Zinc
- D: Mercury

14. Chromyl chloride test is performed to confirm which of the following?

- A: PO_4^{3+}
- B: Cr^{3+}
- C: Cl^- ions
- D: SO_4^{2-} ions

15. The strength of binding energy of transition elements depends upon which of the following?

- A: Number of electrons pairs.
- B: Number of unpaired electrons.
- C: Number of neutrons.
- D: Number of protons.

16. Most of the transition elements show strong?

- A: Ferromagnetism.
- B: Paramagnetism.
- C: Diamagnetism.
- D: None of the above.

17. D-block elements in first series that show anomalous configuration are?

- A: Cr and Ni
- B: Cr and Cu
- C: Cu and Co
- D: Fe anf Ni

18. 4-d-series is in which period?

- A: 4^{th}
- B: 5th
- C: 6^{th}
- D: 7^{th}

19. The series containing elements $_{57}La$,$_{42}Hf$, $_{80}Hg$ is in which period?

- A: 4^{th}
- B: 5th
- C: 6^{th}
- D: 7th

20. 5d-series is in which period?

- A: 4^{th}
- B: 5th
- C: 6th
- D: 7^{th}

Basic Organic Chemistry

TEST 1

1. The self linking property of carbon is called?

- A: Isomerism
- B: Hybridization
- C: Catenation
- D: Cracking

2. **Ka values of different acids are given :**

given.

Acid	Ka
CH_3COOH	1.85×10^{-5}
CCl_3COOH	2.3×10^{-2}
$CHCl_2COOH$	5.0×10^{-3}
$CH_2ClCOOH$	1.3×10^{-3}

The order of acid strength is :

- A: $CCl_3COOH > CHCl_2COOH > CH_2ClCOOH > CH_3COOH$
- B: $CH_3COOH > CCl_3COOH > CHCl_2COOH > CH_2ClCOOH$
- C: $CCl_3COOH > CHCl_2COOH > CH_3COOH > CH_2ClCOOH$
- D: $CH_2ClCOOH > CH_3COOH > CCl_3COOH > CHCl_2COOH$

3. The state of hybridization of carbon atom in methane is?

- A: sp^3
- B: sp^2
- C: sp
- D: None of the above.

4. Which process increases the yield of gasoline from petroleum?

- A: Cracking
- B: Polymerization
- C: Reforming
- D: Sublimation

5. Cis-trans isomerism is also known as?

- A: Geometric Isomerism
- B: Position Isomerism
- C: Chain Isomerism
- D: Function Isomerism

6. **The formula for alanine is :**

A: C_5H_7NO

B: $C_3H_7NO_2$

C: C_5H_3NO

D: $C_3H_3NO_2$

7. **The isomers must have the same?**

A: Structural formula

B: Molecular formula

C: Chemical properties

D: Physical properties.

8. **The vital force theory was rejected by?**

A: Jhon Dalton

B: Friedrick Wohler

C: Dmitri Mendeleev

D: None of the above

9. **Which type of isomerism depends on distribution of carbon atoms on each side of functional group?**

A: Structural isomerism

B: Functional isomerism

C: Chain isomerism

D: Metamerism

10. **Octane no. of any fuel can be improved by a process called?**

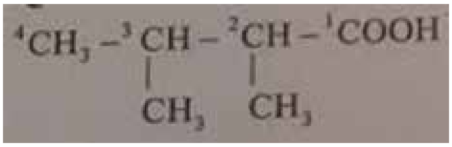
A: Pyrolysis

B: Reforming

C: Polymerization

D: Condensation

11. **In the given compound which one is alpha carbon?**



A: 1

B: 2

C: 3

D: 4

12. **The quality of petroleum is determined by?**

A: Decane number

B: Octane number

C: Hexane number

D: Color

13. Natural Gas mainly consists of?

- A: Mixture of high boiling hydrocarbons
- B: Methane
- C: Sulphur
- D: Both A and B.

14. The octane number of gasoline may increased by adding?

- A: EDTA
- B: $PB(C_2H_5)_4$
- C: NaOH
- D: $AgNO_3$

15. Rate of reactions of most organic compounds are?

- A: Very slow
- B: Very fast
- C: Medium
- D: No typical characteristic in the regard.

16. Which of the following was believed to be true as per the vital force theory?

- A: Organic compounds have different properties as compared to the inorganic compounds
- B: Organic compounds can only be manufactured within a living organism.
- C: Organic compounds can never be synthesized from inorganic compounds.
- D: Both B and C.

17. Linear shape is associated with which set of hybrid orbitals ?

- A: sp
- B: sp^2
- C: sp^3
- D: dsp^2

18. The process in which smaller molecules of alkanes and alkenes are produced from petorleum is known as?

- A: Cracking
- B: Reforming
- C: Alkanizing
- D: Decomposing

19. Natural gas may be used for which of the following purposes?

- A: Power generation
- B: Fertilizer manufacturing
- C: Industrial fuel
- D: All of the above.

20. Metamerism is a type of isomerism that has?

- A: Difference in nature of carbon chain.
- B: Unequal distribution of carbon atoms on either side of functional group.
- C: Difference in the position of same functional group.
- D: Different functional groups.

Test 2

1. **In sp3 hybridization, the geometry of molecules is?**

A: Co-planar
B: Trigonal pyramidal
C: Tetrahedral
D: All are possible

2. **Possible numbers of isomers in the organic compounds increase rapidly with?**

A: Increase in carbon atoms.
B: Increase in hydrogen number
C: Increase in functional group
D: All of the above.

3. **Carbon has the unique ability to form long chains by bonding with other carbon atoms. This property of self linking in carbon is known as:**

A: Condensation
B: Polymerization
C: Catenation
D: Cyclization

4. **In CCl_4 molecule the four valencies of carbon atom are directing towards the corners of a ?**

A: Cube
B: Hexagon
C: Equilateral triangle
D: Tetrahedron

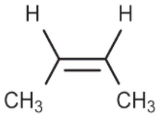
5. **In a double-bonded carbon atom (C=C):**

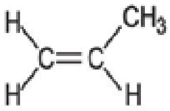
A: Hybridization occurs between the s-orbitals and p-orbitals
B: Hybridization occurs between the s-orbitals and two p-orbitals
C: Hybridization occurs between the s-orbitals and three p-orbitals
D: No hybridization occurs between the s- and p-orbitals

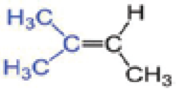
6. **Which of the following is not true about organic compounds?**

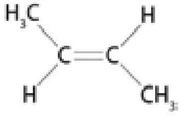
A: They do not show ionic reactions.
B: They have slow rate of reactions.
C: They readily dissolve in water.
D: All of the above.

7. **The cis-isomerism is shown by:**

A: 

B: 

C: 

D: 

8. **1-Chloropropane and 2-Chloropropane are isomers of each other. The type of isomers between them is:**

A: Cis-trans isomerism

B: Chain isomerism

C: Positional isomerism

D: Functional group isomerism

9. **An isomer of ethanol (ethyl alcohol) is?**

A: Dimethyl ether

B: Diethyl ether

C: Ethylene glycol

D: Methanol

10. **Halothane used as an anesthetic in hospitals has a chemical formula?**

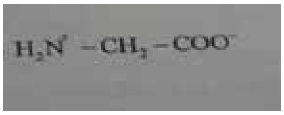
A: 2chloro-1,1,1-trifloroEthane,

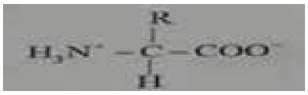
B: 2-bromo-2chloro-1,1,1-trifloroEthane,

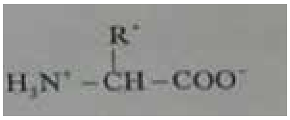
C: 2-bromo-1,1,1-trifloroEthane,

D: 2-fluoro-2chloro-1,1,1-trifloroEthane,

11. **Select the correct zwitter ionic structure of amino acid?**

A: 

B: 

C: 

D:

12. **Octane number of 2,2,4-Trimethyl Pentane is?**

A: 0

B: 1

C: 10

D: 100

13. **Which of the followin isomerism is independent of the functional group?**

A: Chain isomerism

B: Position isomerism

C: Functional group isomerism

D: Both A and B.

14. At what temperature coal is converted it into coke, coal gas, and coal tar in the absence of air?

- A: Temperature ranging from 500-1000°C
- B: Temperature ranging from 1000-2000°C
- C: Temperature ranging from 2000-5000°C
- D: Temperatures above 5000°C

15. Which type of isomerism is shown by the following compounds?

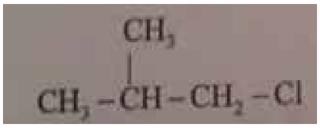
$$CH_3 - O - CH_3 \text{ and } CH_3 - CH_2 - OH$$

- A: Chain isomerism
- B: Position isomerism
- C: Metamerism
- D: Functional group isomerism

16. The figure below shows what kind of isomers?

- A: Position isomers
- B: Metamers
- C: Tautomers
- D: Cis-trans isomers.

17. **The IUPAC name of the given compound is**

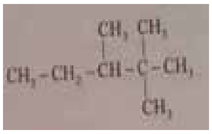
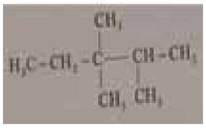
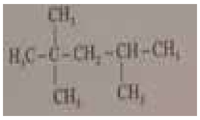
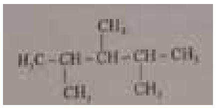


- A: 1-chloro-2-methylpropane
- B: 1-chloro-2-methylbutane
- C: Isobutyl chloride
- D: 2-Methyl-3-Chloropropane

18. Ethylene glycols are used as :

- A: Anaesthetic
- B: Knocking agent
- C: Freezing agent
- D: Anti-freezing agent

19. What is the structural formula of 2,3 trimethylpentane ?

- A: 
- B: 
- C: 
- D: 

20. Which set of hybrid orbitals has a triangular shape?

- A: sp^3
- B: sp
- C: sp^2
- D: dsp^2

Test 3

1. Octane number of gasoline is the percentage of ?

- A: n-pentane in a mixture
- B: n-butane in a mixture
- C: n-hexane in a mixture
- D: 2, 2, 4 – trimethyl pentane in a mixture

2. Which of the following organic compound has sp hybridization?

- A: Methane
- B: Ethane
- C: Ethyne
- D: Ethene

3. The catalyst used in cracking is?

- A: Lead
- B: Sodium
- C: Mixture of silica and alumina.
- D: Mixture of lead and iron.

4. How many pi bonds are formed in the sp hybridization of carbon atom?

- A: 1
- B: 2
- C: 3
- D: 4

5. Which of the following is not an organic compound?

- A: Urea
- B: Oxalic acid
- C: Natural gas
- D: Plaster of Paris

6. Which of the following cracking process requires the lowest temperature?

- A: Thermal cracking
- B: Catalytic cracking
- C: Steam cracking
- D: Cracking is independent of the temperature.

7. A triple bond consists of?

- A: Three sigma bonds
- B: One sigma and two pi bonds.
- C: Two sigma and one pi bond
- D: Three pi bonds.

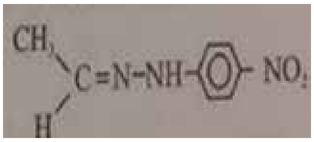
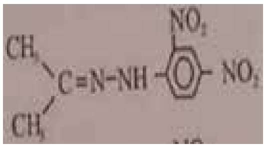
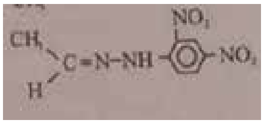
8. **Which of the following compounds does not contain an OH group?**

- A: Alcohol
- B: Phenol
- C: Aldehyde
- D: Carboxylic acid

9. **A double bond consists of?**

- A: Two sigma bond
- B: One sigma and one pi bond
- C: One sigma and two pi bond
- D: Two pi-bond

10. **When acetaldehyde reacts with 2,4 dinitrophenylydrazine which one of the following product is formed?**

- A: 
- B: 
- C:
- D: 

11. **Ethene has what type of hybridization?**

- A: sp
- B: sp^2
- C: sp^3
- D: None of the above.

12. **Simplest hydrocarbon to have structural isomer is?**

- A: C_2H_2
- B: C_3H_8
- C: C_4H_{10}
- D: C_5H_{12}

13. **Which of the following fractions of petroleum has the highest boiling point range (amongst the given list)?**

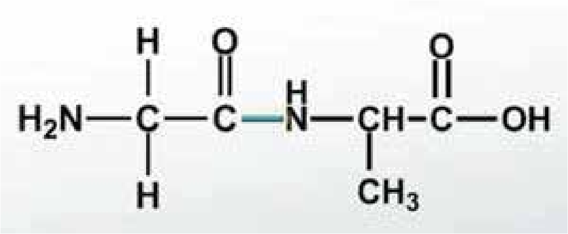
- A: Kerosene
- B: Gasoline
- C: Ligroin
- D: Petroleum ether

14. **Saturated Alicyclic hydrocarbons have general formula?**

- A: C_nH_n
- B: C_nH_{2n}
- C: C_nH_{3n}
- D: $C_{2n}H_{3n}$

15. Cracking process useful for obtaining lower unsaturated hydrocarbons is?

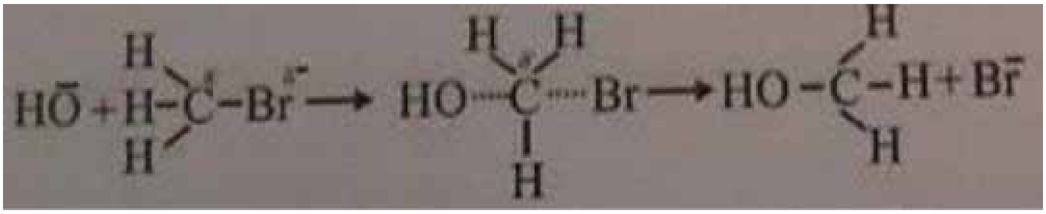
- A: Thermal cracking
- B: Catalytic cracking
- C: Steam cracking
- D: All of the above.



16. The structure is :

- A: Gly-Ala (dipeptide)
- B: Asp-Gly (dipeptide)
- C: Gly-Val (dipeptide)
- D: Asp-Val (dipeptide)

17.



In the above reaction, the configuration of product is :

- A: 100% same of the configuration of reactant.
- B: 50% retained
- C: 50% inverted
- D: 100% opposite from the configuration of reactant

18. A double bond consists of?

- A: Two sigma bonds
- B: One sigma and two pi bonds
- C: Two pi bonds
- D: One sigma and one pi bond.

19. The type of isomerism found in 1 – butene and 2 – butene is ?

- A: Chain isomerism
- B: Position isomerism
- C: Metamerism
- D: Functional group isomerism

20. In sp^2 hybridization the unhybridized orbital is?

- A: Parallel to the triangle.
- B: 90^o to the triangle.
- C: 120^o to the triangle.
- D: 150^o to the triangle.

Test 4

1. Which of the following is an alcohol?

- A: CH_3-O-CH_3
- B: CH_3-CH_2-OH
- C: CH_3-COOH
- D: CH_3-CH_2-NH_2

2. Isomerism arising due to shifting of proton from one atom to another in the same molecule is called?

- A: Cis-trans Isomerism
- B: Ionic isomerism
- C: Tautomerism
- D: Position isomerism

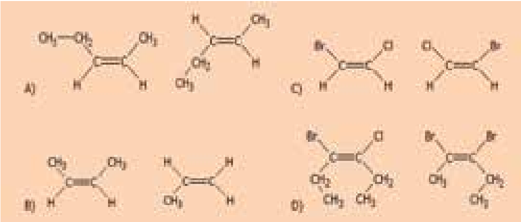
3. Carbolic acids are rather hard to reduce, which of the following compounds is used to convert them to primary alcohols?

- A: H_2SO_4
- B: V_2O_5
- C: $LiAlH_4$
- D: $K_2Cr_2O_7$

4. An organic acid "z" reacts separately with sodium bicarbonate, sodium hydroxide, and sodium carbonate. Which one of the followings represents the structure of "z"

- A: $HCOOC_2H_5$
- B: CH_3-CH=CH_2
- C: CH_3CH_2OH
- D: H_3C-CH_2-COOH

5. Which one of the following are cis and trans isomers of each other?



- A: A
- B: B
- C: C
- D: D

6. The structure of alkynes can be explained by which type of hybridization?

- A: sp^2 hybridization
- B: sp^3 hybridization
- C: sp^5 hybridization
- D: sp hybridization

7. Different organic compounds with similar behaviour are called?

- A: Isomers
- B: Catons
- C: Metamers
- D: Homologous series

8. Coal is believed to be produced after a long time decay of ?

- A: Animals
- B: Fossils
- C: Wood
- D: Ores

9. Which chemist synthesized urea from ammonium cyanate?

- A: Berzelius
- B: Kolbe
- C: Wholer
- D: Lavoisier

10. Isomers are only possible in hydrocarbons when they contain more than?

- A: 2 carbon atoms.
- B: 3 carbon atoms.
- C: 4 carbon atoms.
- D: 5 carbon atoms.

11. Which one of the following shows correct formula of glutamic acid?

- A: $C_5H_9NO_4$
- B: C_5H_9NO
- C: $C_5H_7NO_4$
- D: $C_8H_9NO_4$

12. Which one of the following is an acyclic hydrocarbon?

- A: C_6H_6
- B: C_2H_6
- C: C_6H_{12}
- D: CH_4

13. The properties of organic compounds are defined by?

A: Covalent bonds
B: Functional groups
C: Ionic bonds
D: Geometry of molecules

14. Which of the following is not an organic compounds classification?

A: Acyclic
B: Aromatic
C: Isomer
D: Saturated

15. Which of the following isomers require a lot of energy for their formation?

A: Position isomerism
B: Cis-trans isomerism
C: Tautomerism
D: Metamerism

16. Which of them is heterocyclic organic compound?

A: Benzene
B: Cresol
C: Naphthalene
D: Pyridine

17. Which one of the following acids is a basic amino acid?

A: Glycine
B: Alanine
C: Lysine
D: Glutamic acid

18. Bond angle in sp^3 hybridization is?

A: 109.5^o
B: 120^o
C: 150^o
D: 180^o

19. The organic compounds containing at least one benzene ring are called?

A: Homocyclic compounds
B: Heterocyclic compounds
C: Alicyclic compounds
D: Aromatic compounds

20. Ethers show the which type of isomerism?

A: Position isomerism
B: Functional group isomerism\
C: Cis-trans isomerism
D: Metamerism

Hydrocarbons

TEST 1

1. **"The possibility of different pairing schemes of valence electrons of atoms" is called?**

- A: Pauli's exclusion principle
- B: Auf bau principle
- C: Resonance
- D: Hund's rule

2. **The conversion of n-hexane into benzene by heating in the presence of $Cr_2O_3 + Al_2O_3 + SiO_2$ is called?**

- A: Isomerization
- B: Aromatization
- C: Dealkylation
- D: Rearrangement

3. **Which of the following is a free radical?**

- A: Cl^+
- B: NO_2^-
- C: Cl^o
- D: Cl^-

4. **Acylation of benzene to produce aliphatic aromatic ketones is known as?**

- A: Clemmensen reduction
- B: Hydroformylation
- C: Benzoin condensation
- D: Friedal-Craft's reaction

5. **Alkyl halides on heating with alcoholic potassium hydroxide undergo dehydrohalogenation to produce?**

- A: Alkanes
- B: Alkenes
- C: Alkynes
- D: Both b and c

6. **Benzene has how many π electrons?**

- A: 4 π electrons
- B: 8 π electrons
- C: 6 π electrons
- D: 3 π electrons

7. **Olefins refer to which of the following?**

- A: Alkenes
- B: Compounds having double bonds
- C: Saturated hydrocarbons
- D: Unsaturated hydrocarbons

8. **Hoffmann found benzene in which of the following?**

- A: Vegetable oil
- B: Coal
- C: Petroleum
- D: Coal tar

9. Which of the following species has carbon atom as negatively charged?

- A: Carbanion
- B: Carbonium ion
- C: Carbocation
- D: Free radical

10. Formation of ethyne from ethylene bromide is an example of?

- A: Spontaneous reaction
- B: Elimination reaction
- C: Substitution reaction
- D: Addition reaction

11. Lindllar's catalyst is poisoned by which of the following?

- A: Pd($BaSO_4$)
- B: Quinoline
- C: Na
- D: Liquid ammonia

12. The shape of benzene molecule is?

- A: Planar trigonal
- B: Linear
- C: Plane hexagonal
- D: Pyramidal

13. Aromatic hydrocarbons are the derivatives of?

- A: Normal series of paraffins
- B: Alkene
- C: Benzene
- D: Cyclohexane

14. The conversion of n-hexane into benzene by heating in the presence of Cr_2O_3 is called?

- A: Dehydrogenation
- B: Aromatization
- C: Dealkylation
- D: Isomerization

15. What is the general formula of alkanes?

- A: C_nH_{2n+4}
- B: C_nH_{2n}
- C: C_nH_{2n-2}
- D: C_nH_{2n+2}

16. The benzene molecule contains?

- A: Three sp^3 hybrid carbons
- B: Three sp^2 hybrid carbons
- C: Six sp^3 hybrid carbons
- D: Six sp^2 hybrid carbons

17. During nitration of benzene, the active nitrating agent is?

- A: NO_3
- B: NO_2^+
- C: NO
- D: HNO_3

18. Which of the following is used as an anaesthetic?

- A: Methane
- B: Ethene
- C: Ethyne
- D: Acetylene

Test 2

1. Which of the following product is produced on the dehydration of alcohols?

A: Alkene
B: Alkyne
C: Acids
D: Aldehydes

2. A secondary carbon atom is one that is joined to:

A: Methyl group
B: Three alkyl groups
C: Two alkyl groups
D: One alkyl group

3. The benzene molecule contains?

A: Three double bonds
B: Two double bonds
C: One double bond
D: Delocalized π-electrons charge

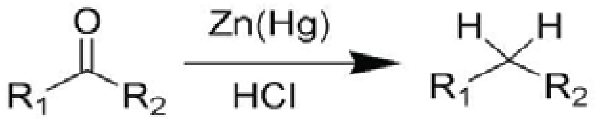
4. Which of the following salt is used for the preparation of alkanes by Kolbe's electrolysis method?

A: Sodium or potassium salt of monocarboxylic acid.
B: Sodium or potassium salt of dicarboxylic acid.
C: sodium or potassium salt of unsaturated dicarboxylic acid.
D: All of these can be used.

5. What is the order of reactivity of halogens for the halogenation of alkanes?

A: $F_2 > Cl_2 > Br_2 > I_2$
B: $F_2 > Br_2 > Cl_2 > I_2$
C: $I_2 > Br_2 > Cl_2 > F_2$
D: $I_2 > Cl_2 > Br_2 > F_2$

6. The reaction given below is called?



A: Fehling's test
B: Clemmensen's reaction
C: Sodium Nitroprusside test
D: Wolf-kishner's reaction

7. **When aluminium carbide is treated with water, we get which of the following?**

- A: Ethyl formate
- B: Acetaldehyde
- C: Ethylene
- D: Methane

8. **In which case the C-C bond length is the same?**

- A: Propyne
- B: 1-Butene
- C: 2-Butene
- D: Benzene

9. **Nitration of toulene takes place at?**

- A: Both o- and p- positions
- B: m- position
- C: O- position
- D: p- position

10. **The compound with an atom which has unshared pair of electron is called:**

- A: Electrophile
- B: Nucleophile
- C: Protonophile
- D: None of these

11. **Polymerization of acetylene forms which of the following?**

- A: Propane
- B: Butane
- C: Benzene
- D: Naphthalene

12. **Ammonical solution of silver nitrate reacts with which of the following to give while precipitates?**

- A: Ethyne
- B: Ethanol
- C: Ethene
- D: Methane

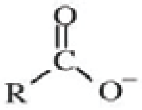
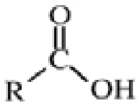
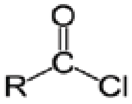
13. **Dehydrohalogenation of Alkyl Halides occur in the presence of?**

- A: An alcoholic base
- B: Alcoholic acid
- C: An alcoholic salt
- D: An alcoholic grignard reagent

14. **Which of the following compound is polycyclic?**

- A: Xylene
- B: Napthalene
- C: Styrene
- D: Cumene

15. **The introduction of an alkyl group in benzene takes place in the presence of $AlCl_3$ and:**

- A: 
- B: 
- C: 
- D: R-Cl

16. **What is the reactivity of alkynes towards electrophilic reagent as compared to alkenes?**

- A: Less reactive towards electrophiles
- B: More reactive towards electrophile
- C: Does not react with electrophile
- D: Few compounds are highly reactive and others are less reactive towards electrophile

17. **Which of the following decolourizes the aqueous bromine?**

- A: 1-pentene
- B: Pentane
- C: 2-methyl-1-butene
- D: Both a and c

18. **Which of the following compounds are produced on the reduction of ozonides by treating with Zn and water?**

- A: Aldehydes
- B: Acetones
- C: Ketones
- D: All of the above

19. **The substitution -H by NO_2 in benzene ring is called:**

- A: Nitration
- B: Ammonolussis
- C: Sulphonation
- D: Reduction of benzene

20. **Ortho and para groups are generally?**

- A: Neutral groups
- B: Deactivating groups
- C: Activating groups
- D: None of the above

Test 3

1. **Acetylides reacts with acids to produce alkynes.The process of alkynes regeneration is used for?**

- A: Purification of alkynes
- B: Identification of alkynes
- C: Preparation of alkynes
- D: All of the above

2. **Alkanes can be prepared by which of the following method?**

- A: Decarboxylation of monocarboxlic acids
- B: Sabatier-Sendern's reaction
- C: Reduction of carbonyl compounds
- D: All of the above.

3. **Which of the following compounds will not give a precipitate with Tollen's reagent?**

- A: 1-Butyne
- B: Ethyne
- C: 2-Pentyne
- D: 1-Pentyne

4. **Halogenation of alkanes is an example of which of the following?**

- A: Oxidation
- B: Electrophilic substitution
- C: Neucleophilic substitution
- D: Free radical substitution

5. **The addition of HX to an alkene involves which of the following steps?**

- A: Transfer of proton from HX towards alkene.
- B: Combination of carbocation with the X^{-1} ion.
- C: Both A and B.
- D: None of the above.

6. **Which of the following compounds reacts slower than benzene in electrophilic substitution?**

- A: Phenol
- B: Nitrobenzene
- C: Toulene
- D: Aniline

7. **Aromatic compounds burn with sooty flame because?**

- A: They have high percentage of hydrogen
- B: They have a ring structure
- C: They have high percentage of carbon
- D: They resist reaction with air

8. **The electrophile in aromatic sulphonation is?**

- A: H_2SO_4
- B: HSO_4^-
- C: SO_3
- D: SO_3^+

9. **Which of following is formed by reacting alkyne with ammonia?**

- A: Acrylonitrile
- B: Methyl cyanide
- C: Methyl nitrile
- D: Oxalic acid

10. **Which of the following is the molecular formula of TNT?**

- A: $C_6H_2(NO_2)_3CH_3$
- B: $C_6H_3(NO_2)_3CH_3$
- C: $C_6H_2(NO_2)_3C_2H_5$
- D: $C_6H_2(NO_2)_3C_3H_7$

11. **Which of the following method can not be used to prepare ethane?**

- A: Kolbe's electrolysis method
- B: Clemmensen's reduction
- C: Wolf-kishner's reduction
- D: Decarboxylation of monocarboxylic acid

12. **When propyne is treated with aqueous H_2SO_4 in the presence of $HgSO_4$ then the product formed is?**

- A: Propyl hydrogen sulphate
- B: Acetone
- C: Propanal
- D: Propanol

13. **Ethene polymerizes to polythene under the parametic conditions of?**

- A: 100atm,100°C and 0.1% O_2
- B: 100atm,400°C and 0.1% O_2
- C: 400atm,100°C and 0.1% O_2
- D: 400atm,150°C and 0.1% O_2

14. **The melting point of palmitic acid is?**

- A: 62.9 °C
- B: 63.1 °F
- C: -8 °C
- D: -8 °F

15. Hydroxylation of alkenes produces?

- A: Ketones
- B: Polyhydric alcohols
- C: Esters
- D: Alkynes

16. Which of the following is a Lindlar's catalyst?

- A: Pd + $BaSO_4$
- B: Platenized charcoal deactivated with sulphur compounds
- C: Pd + H_2
- D: Pd + CO_2

17. Which one of the following molecules has shortest distance of carbon atoms?

- A: CH_3-CH_3
- B: $CH_2 = CH_2$
- C: CH = CH
- D: CH_3-CH_2-CH_3

18. Which of the following test can be used for distinguishing an alkane and alkene?

- A: Bromine water test
- B: Hydroxylation
- C: Ozonolysis
- D: All of the above

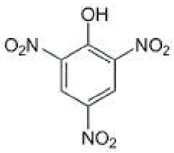
19. Markownikoff's rule provides guidance on the addition of HBr on which of the following?

- A:
- B: $CH_3CH=CHCH_3$
- C: $CH_3CH=CH_2$
- D: $CH_2=CH_2$

20. Which of the following test is used for determining the location of double bond in alkenes?

- A: Bromine water test
- B: Ozonolysis
- C: Baeyer's test
- D: All of the above

Test 4

1.  **is named as:**

- A: Nitro phenol
- B: Benzoic acid
- C: Malonic acid
- D: Picric acid

2. Which of the following is called Baeyer's reagent is?

- A: 1% alkaline $KMnO_4$
- B: 1% acidified potassium dichromate
- C: $(R)_3Al$ and $TiCl_4$
- D: Liquid ammonia

3. Which of the following is used in oxyacetylene torch used for cutting and welding metals?

- A: Ethylene
- B: Acetylene
- C: Ethyne
- D: Both b and c

4. Number of acidic hydrogen/s present in 1-Butyne is?

- A: 1
- B: 2
- C: 4
- D: 6

5. Neoprene is formed by the polymerization of which of the following?

- A: Acetylene
- B: Chloroprene
- C: Divinyl acetylene
- D: 1,5-Hexadiene-3-yne

6. The reaction of toulene with Cl_2 in the presence of $FeCl_3$ gives which of the following?

- A: Chloro benzene
- B: Benzyl chloride
- C: m-chlorotoulene
- D: o- and p-chlorotoulene

7. **As compared to boiling points of linear chain isomers, the boiling points of branched chain alkanes are:**

- A: Higher
- B: Lower
- C: Same
- D: Does not depend upon branching

8. **What is the general formula of alkenes?**

- A: C_nH_{n+2}
- B: C_nH_{2n}
- C: C_nH_{2n-2}
- D: C_nH_{2n+2}

9. **Kolbe's synthesis of sodium salt of botanic acid gives:**

- A: Ethylene
- B: n-Hexane
- C: Iso-butene
- D: Butane

10. **Which of the following reacts with metal by displacing H-atom and releasing hydrogen gas?**

- A: Methane
- B: Ethane
- C: Ethene
- D: Ethyne

11. **Alkynes give aldehydes and ketones by reacting with?**

- A: Water in the presence of sulphuric acid and mercuric sulphate
- B: Water in the presence of hydrum sulphate and sulphuric acid
- C: Water in the presence of mercuric sulphate and $KMnO_4$
- D: All of the above.

12. **Which of the following compound is the most reactive?**

- A: Benzene
- B: Ethene
- C: Ethane
- D: Ethyne

13. **Which of the following acid can be used as a catalyst in Friedal-Craft's reaction?**

- A: $AlCl_3$
- B: HNO_3
- C: $BeCl_2$
- D: HCl

14. Which of the following products is formed on the incomplete oxidation of alkanes in a limited supply of oxygen or air?

- A: Carbon dioxide and water
- B: Carbon mono oxide and water
- C: Carbon monoxide, carbon and water
- D: Carbon dioxide, carbon monoxide

15. Which of the following is the Baeyer's reagent?

- A: Aqueous Br_2 water
- B: Neutral permanganate
- C: Acidic $KMnO_4$
- D: Alkaline $KMnO_4$

16. Ethene reacts with steam at 300°C in the presence of phosphoric acid as a catalyst to form?

- A: Ethane
- B: Ethanol
- C: Ethanoic acid
- D: Ethyl ethanoate

17. Which of the following is a Baeyer's reagent?

- A: Aqueous Br_2 water
- B: Neutral permanganate
- C: Acidic $KMnO_4$
- D: Alkaline $KMnO_4$

18. Vicinal dihalides with zinc dust gives which of the following?

- A: Alkenes
- B: Alkanes
- C: Alkynes
- D: All of them

19. When methane reacts with Cl_2 in the presence of diffused light, which of the following products are obtained?

- A: Chloroform
- B: Carbon tetrachloride
- C: Dichloromethane
- D: Mixture of a, b and c

20. Which of the following compound shows maximum repulsion with water?

- A: C_6H_6
- B: C_2H_5OH
- C: $CH_3CH_2CH_2OH$
- D: CH_3OCH_3

Alkyl Halides

TEST 1

1. Which of the following are also called alkyl halides?

A: Monohaloalkanes
B: Dihaloalkanes
C: Trihaloalkanes
D: Polyhaloalkanes

2. When alcohols react with phosphorus trihalides to form alkyl halides, which by-product is formed in this reaction?

A: H_3PO_3
B: $POCl_3$
C: HCl
D: Both b and c

3. Why substrate carbon atom changes its state of hybridization in S_N2 mechanism of alkyl halides?

A: To speed up reaction
B: To provide more product
C: Permanent change is required in hybridization
D: To Provide enough room to attack Nu

$$ROH + HX \longrightarrow RX + H_2O$$

4. Which catalyst is required for this reaction?

A: Pyridine
B: ThO_2
C: $ZnCl_2$
D: NaOH

5. How many classifications of alkyl halides are there?

A: Two
B: Three
C: Four
D: Five

6. Which of the following is not a good leaving group?

A: Cl^-
B: Br^-
C: HSO^-_4
D: OH^-

7. **Which of the following alkyl halide show both S_N1 and S_N2 mechanism?**

- A: Primary alkyl halides
- B: Secondary alkyl halides
- C: Tertiary alkyl halides
- D: All of the above.

8. **In secondary alkyl halides, the halogen atom is attached to a carbon atom which is further attached to?**

- A: Two hydrogen atoms
- B: Two halogen atoms
- C: Two carbon atoms
- D: One halogen and one hydrogen

9. **What is the condition in nucleophilic Substitution Bimolecular mechanism of alkyl halides?**

- A: Extent of bond breakage > Extent of bond formation
- B: Extent of bond breakage = Extent of bond formation
- C: Extent of bond breakage is < Extent of bond formation
- D: Bond breakage first followed by bond formation

10. **The strength of bonds shows that fluoro compounds will be ________ and have _________ bond?**

- A: Less reactive, strongest
- B: Less reactive, weakest
- C: Most reactive, strongest
- D: Most reactive, weakest

11. **How many processes are involved in nucleophilic substitution mechanism of alkyl halides?**

- A: Two
- B: Three
- C: Four
- D: Five

12. **Which factors are involved in the first step of nucleophilic substitution unimolecular of alkyl halides?**

- A: Reversible, Slow
- B: Ionization of alkyl halide
- C: Rate determining
- D: All of the above.

13. **In a nucleophilic substitution reaction if bond breakage happens first and is followed by a bond formation, the mechanism is shown by which alkyl halides?**

- A: Primary Alkyl halides
- B: Secondary alkyl halides
- C: Tertiary alkyl halides
- D: Both b and c

14. The reaction is called a Bimolecular reaction of alkyl halide if?

- A: Two molecules take part in the rate determining step
- B: Two molecules take part in the reaction
- C: Two molecules of products are formed in the reaction
- D: One molecule of reactant and one molecule of product in the chemical reaction

15. Nucleophile in nucleophilic substitution bimolecular mechanism of alkyl halides attacks from which side?

- A: Attacks from the side opposite to the leaving group
- B: Attacks from the same side as of the leaving group
- C: Attack does not depend on the side
- D: May be a or b

16. Which of the following react with NaI to prepare simple Alkyl Iodide?

- A: Alkyl fluoride
- B: Alkyl chloride
- C: Alkyl bromide
- D: Both b and c.

17. Which of the following Is the rate determining step in S_N1 mechanism of alkyl halide?

- A: First step
- B: Second step
- C: Both a and b
- D: May be a or b

18. Which of the following product is formed on the complete reaction of Ethyl bromide with ammonia?

- A: Ethylamine
- B: Diethylamine
- C: Quaternary ethylammonium
- D: Triethylamine

19. How many steps are involved in the Nucleophilic substitution of bimolecular mechanism of alkyl halides?

- A: One
- B: Two
- C: Three
- D: Four

20. Elimination of bimolecular reactions of alkyl halides involves?

- A: First order kinetics
- B: Second order kinetics
- C: Third order kinetics
- D: Zero order kinetics

Test 2

1. Aryl halides are less reactive towards electrophones than alkyl halides due to?

- A: High boiling point
- B: Resonance
- C: Stability of carbonium ion
- D: None of these

2. Order of reactivity of alkenes with hydrogen halide is

- A: HBr > HI > HCl
- B: HI > HBr > HF
- C: HF > HI > HCl
- D: HI> HBr > HCl

3. Consider the following reaction:

$C_2H_5OH + PCl_5$ -----------> ?

what product(s) may be formed?

- A: C_2H_5Cl, $POCl_3$ and HCl
- B: C_2H_5Cl and $POCl_3$
- C: C_2H_5Cl only
- D: C_2H_5Cl and HCl

4. What creates the polarity between the two atoms of a compound?

- A: Eletron Affinity
- B: Electronegativity
- C: Electropositivity
- D: Atomic size of atoms

5. Grignard reagent react with water give?

- A: Alcohol
- B: Alkyl halide
- C: Alkane
- D: All

6. What is the order of reactivity for halogens in the preparation of Grignard reagent?

- A: $C_3H_7X > C_2H_5X > CH_3X$
- B: $CH_3X > C_3H_7X > C_2H_5X$
- C: $CH_3 > C_2H_5X > C_3H_7X$
- D: $C_2H_5X > CH_3X > C_3H_7X$

7. An alkyl halide can be converted into alkenes by?

- A: Dehydration
- B: Substitution
- C: Elimination
- D: Addition

8. In S_N1 mechanism the nucleophile attacks from which side?

- A: Opposite direction to the leaving group
- B: Same direction as of the leaving group
- C: Independent of direction
- D: Depends on the provided conditions

9. Which solvent is required for the ionization of alkyl halides in the first step of nucleophilic substitution unimolecular mechanism?

- A: Aqueous acetone
- B: Aqueous ethyl alcohol
- C: Aqueous NaOH
- D: A or B both can be used

10. Which of the following do not form Grignard reagent?

- A: RCl
- B: RF
- C: RBr
- D: RI

11. In nucleophilic reaction of alkyl halide if the breakage of C-X bond and Formation of C-Nu bond occurs simultaneously, this reaction is given by?

- A: Primary alkyl halides
- B: Secondary alkyl halides
- C: Tertiary alkyl halides
- D: Both a and b

12. The reactivity of alkyl halides govern by which of the following factor(s)?

- A: Bond Energy
- B: Bond polarity
- C: Bond length
- D: Both a and b

13. How many factors govern the reactivity of alkyl halides?

- A: 2
- B: 4
- C: 6
- D: 8

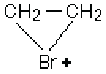
14. S_N1 nucleophilic substitution mechanism is?

- A: Single step bimolecular
- B: Two step bimolecular
- C: Single step unimolecular
- D: Two step unimolecular

15. The rate of E1 reactions depends upon?

- A: The concentration of nucleophile
- B: The concentration of substrate
- C: Both of the above
- D: None of the above

16. In the reaction of ethene with bromine the intermediate form is:

- A: $Br-CH_2-CH_2$
- B: $Br-CH_2^+-CH_2$
- C: 

- D: $CH_2=CHBr$

17. Dehydrohalogenation of alkyl halides yields?

- A: Alkenes
- B: Alkynes
- C: Aloxy alkane
- D: Mixture of alkenes and aloxy alkanes

18. How the state of hybridization changes in the Nucleophilic substitution bimolecular mechanism of alkyl halides?

- A: From sp^3 to sp^2
- B: From sp^3 to sp
- C: From sp^2 to sp^3
- D: From dsp^3 to sp

19. In substitution reactions dihaloalkanes or secondary halogen alkanes give/show:

- A: S_N1 mechanism
- B: S_N2 mechanism
- C: Both S_N1 and S_N2
- D: Both E_1 and E_2

20. Which of the following always give S_N1 mechanism of alkyl halide?

- A: Primary alkyl halide
- B: Secondary alkyl halide
- C: Tertiary alkyl halide
- D: Both b and c

Test 3

1. **Which of the following is a good nucleophile as well as a good leaving group?**

- A: I^-
- B: HSO^-_4
- C: OH^-
- D: NH^-_2

2. **Anti-knocking agent cause which of the following pollution?**

- A: Water pollution
- B: Land pollution
- C: Air pollution
- D: Noise pollution

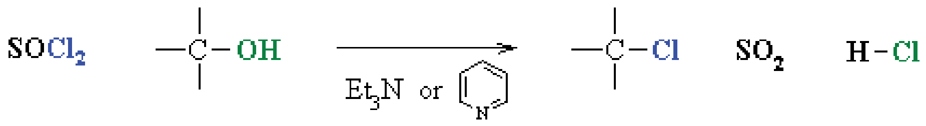
3. **When an electrophile attacks on Alkyl halide, the bond polarity prefers which of the following compound to be most reactive?**

- A: R-F
- B: R-Cl
- C: R-Br
- D: R-I

4. **What is the intermediate product of the S_N1 reactions?**

- A: Carbocation
- B: Carboanion
- C: Carbonium ion
- D: Both a and c

5. **What is the order of reactivity for the reaction given below?**



- A: HBr > HI > HCl
- B: HCl > HBr > HI
- C: HI > HCl > HBr
- D: HI > HBr > HCl

6. **Beta elimination reactions are due to?**

- A: Attack of the incoming nucleophile on alpha hydrogen
- B: Attack of incoming nucleophile on beta hydrogen
- C: Attack of incoming nucleophile on gamma hydrogen
- D: 1st order kinetics

7. **When an alkyl iodide is allowed to stand, it darkens because it?**

- A: Dehydrates
- B: Is oxidized
- C: Is polymerized
- D: Liberates I_2

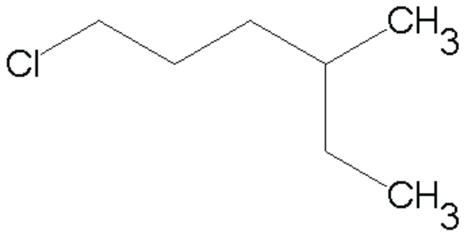
8. **Alky halide on treatment with alcoholic KOH gives which of the following?**

- A: Aldehydes
- B: Ketones
- C: Alkenes
- D: Alkanes

9. **Grignard reagents adds to which of the following functional groups?**

- A: -C=S
- B: -C=O
- C: - $C=N_2$
- D: All of them.

10. **The I.U.P.A.C. name of the given structural formula is?**



- A: 1-Chloro-4-methylhexane
- B: 6-Chloro-3-methylhexane
- C: 1-Chloro-4-ethylbutane
- D: 3-Propyl-3-cloropropane

11. **Consider the reaction given below:**

$$CH_3CH_2CH_2CH_2Br \begin{cases} \text{I} \text{ ---------->} CH_3CH_2CH_2CH_2OH \\ \text{II} \text{ ----------->} CH_3CH_2CH{=}CH_2 \end{cases}$$

Which statement is true?

- A: Reagent for I is KOH in alcohol
- B: Reagent for II is elimination
- C: Reagent for II is KOH in aqueous medium
- D: Reaction I is debromination

12. **The preparation of symmetrical alkane (ethane) by electrolysis is through which method?**

- A: Wurtz reaction
- B: Williamsons reaction
- C: Kolbe's reaction
- D: Grignard reaction

13. Which of the following is correct about S_N1 reactions?

- A: Retention of the configuration of the alkyl halide molecule
- B: Unimolecular
- C: Reaction rate is the function of the [Alkyl halide]
- D: All of the above

14. Tertiary alkyl halides show?

- A: S_N1 and E1
- B: S_N2 and E2
- C: S_N2 and E1
- D: None of the above

15. Grignard reagents undergoes which of the following?

- A: Nucleophilic substitution
- B: Nucleophilic addition
- C: Both a and b
- D: Neither of them

16. Tertiary alcohol is obtained by treating grignard reagent with?

- A: HCHO
- B: CH_3CHO
- C: CO_2
- D: CH_3COCH_3

17. The correct order of the melting and boiling point of the primary, secondary and tertiary alkyl halides is?

- A: Tertiary > Primary > Secondary
- B: Secondary > Tertiary > Primary
- C: Tertiary > Secondary > Primary
- D: Primary > Secondary > Tertiary

18. Grignard reagents react with CO_2 to form?

- A: Alkane
- B: Aldehyde
- C: Acid
- D: Ketone

19. For which of the following mechanism the first step is same?

- A: E1 and E2
- B: E2 and S_N2
- C: E1 and S_N2
- D: E1 and S_N1

20. The rate of reaction in S_N2 mechanism of alkyl halide is given by?

- A: Rate=[Alkyl halides]
- B: Rate=[Nucleophile]
- C: Rate=[Alkyl halide][Nucleophile]
- D: Rate=k[Alkyl halide][Nucleophile]

Test 4

1. What is the order of reactivity of alkyl halides on the basis of bond strength?

- A: R-F > R-Cl > R-Br > R-I
- B: R-F > R-Br > R-Cl > R-I
- C: R-I > R-Cl > R-Br > R-F
- D: R-I > R-Br > R-Cl > R-F

2. Alkyl halides are considered to be reactive compounds towards nucleophile because?

- A: They have an electrophilic carbon atom.
- B: They have an electrophile carbon and a good leaving group.
- C: They have an electrophile carbon and a bad leaving group.
- D: They have an nucleophilic carbon atom and a good leaving group.

3. Which of the following solvents is used instead of ether in the preparation of grignard's reagent?

- A: $C_6H_5N(CH_3)_2$
- B: THF
- C: $C_6H_5OCH_3$
- D: All

4. What is the nature of bond form between C-Mg in the grignard reagents?

- A: Polar
- B: Highly polar
- C: Nonpolar
- D: Highly nonpolar

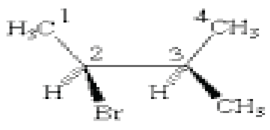
5. Nucleophile attacks on the alkyl halide molecule which is called?

- A: Electrophile
- B: Leaving group
- C: Substrate
- D: Electrophilic center

6. How many sub categories of alkyl halides are there?

- A: Two
- B: Four
- C: Six
- D: Eight

7. The I.U.P.A.C. name of the given structural formula is?



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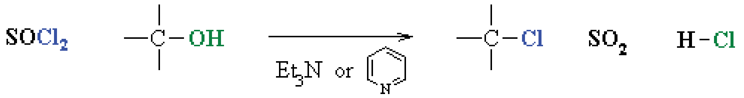
- A: 3-Bromo-2-methylbutane
- B: 2-Bromo isobutyl
- C: 3,3-Dimethyl propylbromide
- D: 2-Bromo-3-methylbutane

8. Grignard reagent react with water give?

- A: Alcohol
- B: Alkyl halide
- C: Alkane
- D: All

9. Primary alkyl halides show?

- A: E2 and S_N2 reactions
- B: E1 and S_N1 reactions
- C: Either E1 or E2
- D: S_N2 and E1 reaction



10. What is the role of pyridine in this reaction?

- A: It acts as catalyst in the reaction.
- B: It is used as solvent in the reaction.
- C: It is used to purify product.
- D: All of the above.

11. Which of the following is the most efficient anti-knocking agent?

- A: Tetramethyl lead
- B: Tetraethyl lead
- C: Tetrapropyl lead
- D: Tetrabutyl lead

12. What is the shape of carbocation?

- A: Tetrahedral
- B: Octahedral
- C: Linear
- D: Planar

13. Primary alcohols is obtained by treating grignard reagent with?

- A: Acetaldehyde
- B: Formaldehyde
- C: Carbondioxide
- D: Propanone

14. **Symmetrical alkanes are prepared by which of the following process?**

- A: Kolbe's electrolytic method
- B: Williamsons synthesis
- C: Wurtz synthesis
- D: Friedel-crafts reactions

15. **When an electrophile attacks on Alkyl halide, the electronegative difference between atoms in an alkyl halide prefers which of the following alkyl halide to be least reactive?**

- A: R-F
- B: R-Br
- C: R-Cl
- D: R-I

16. **In nucleophilic substitution unimolecular reaction of alkyl halide rate depends on which of the following?**

- A: Concentration of alkyl halide
- B: Concentration of nucleophile
- C: Both a and b
- D: Concentration of carbonium ion

17. **If halogenoalkanes are mixed with an excess of ethanolic ammonia and heated under pressure, amine are formed. Which amine is formed in the following reaction?**

$CH_3CH_2Br + NH_3$ ------> Amine

- A: CH_3CH_2-NH-CH_2CH_3
- B: CH_3CH_2-NH_2
- C: $CH_3CH_2CH_2NH_3$
- D: H_2N-CH_2-CH_2-NH_3

18. **Which of the following is the best method to prepare alkyl halides in which a pure product of alkyl halide is obtained?**

- A:
- B: $ROH + HX \longrightarrow RX + H_2O$
- C:
- D: All of the above.

19. **What are the characteristics of an electrophile?**

- A: Electron loving
- B: Positively charged
- C: Neutral
- D: All of the above

20. **The alkaline hydrolysis of bromoethane shown below gives alcohol as the product :**

CH_3-CH_2-Br -------> CH_3-CH_2-OH

The reagent and the condition used in this reaction may be:

- A: Water at room temperature
- B: Ethanol, Heat
- C: Dilute $NaOH_{(aq)}$, Warm
- D: KOH in alcohol

Alcohols, Phenols & Ethers

TEST 1

1. **Which of the following is prepared on the industrial scale through fermentation?**

A: Methanol
B: Acetic acid
C: Ethanol
D: Ethanal

2. **$C_{12}H_{22}O_{11}$ (Molasses) +H_2O -------> $C_6H_{12}O_6$+$C_6H_{12}O_6$. Which enzyme is required for this reaction?**

A: Zymase
B: Maltase
C: Diatase
D: Invertase

3. **Ethanol is converted into ethanoic acid by:**

A: Fermentation
B: Oxidation
C: Hydration
D: Hydrogenation

4. **Methanol used as solvent for which of the following?**

A: Oils
B: Varnishes
C: Paints
D: All of the above.

5. **Ethanol is used for which of the following purposes?**

A: Preservative
B: In pharmaceuticals preparations
C: Fuel
D: All of the above.

6. **Ethers do not have which of the following properties?**

A: Volatile liquid, highly inflammable.
B: Slightly soluble in water.
C: Hydrogen bonding with water.
D: Hydrogen bonding with each other.

7. In Lucas test which of the following alcohol type form an oily layer immediately?

- A: Primary alcohols
- B: Secondary alcohols
- C: Tertiary alcohols
- D: None of the above.

8. Monohydric alcohols contain how many -OH group?

- A: One
- B: Two
- C: Three
- D: Four

9. Picric acid is obtained by the nitration of?

- A: Benzene
- B: Cresol
- C: Phenol
- D: Aniline

10. There are how many systems for naming alcohols?

- A: One
- B: Two
- C: Three
- D: Four

11. What is the typical yield of alcohol by industrial fermentation?

- A: upto 10%
- B: Upto 12%
- C: Upto 14%
- D: Upto 18%

12. Which of the following is the general formula of "Alcohol"?

- A: ROR
- B: ROH
- C: ROOH
- D: RCOOH

13. Which of the following is prepared by the fermentation of molasses,starch grain or fruit juices?

- A: Methanol
- B: 1-Propanol
- C: 1-Butanol
- D: Ethanol

14. This is the equation of idoform test,

$$C_2H_5OH + 4I_2 + 6NaOH \text{ -----------> } CHI_3 + HCOONa + 5NaI + 5H_2O$$

Which of the following substance form yellow cystals?

- A: CHI_3
- B: NaI
- C: HCOONa
- D: None of the above.

15. $R\text{-}CH_2\text{-}OH + HCl$ --------> $R\text{-}CH_2\text{-}Cl + H_2O$: What are the necessary conditions for this reaction to take place?

- A: $ZnCl_2$ as catalyst
- B: $ZnCl_2$ as catalyst plus wait for 5-10 mins.
- C: $ZnCl_2$ as catalyst plus heat
- D: $ZnCl_2$ as catalyst + H_2SO_4

16. What is th I.U.P.A.C name of CH_3OH?

- A: Methnol
- B: Methyl alcohol
- C: Methanoic
- D: Methanine

17. Phenol was first obtained from which of the following?

- A: Coal tar
- B: Vegetable oil
- C: Fish oil
- D: Petroleum

18. ____ , ____ and _____ are classes of organic compounds which are much closer to water in structure and hence considered as the derivatives of water?

- A: Alcohols, ketones and aldehydes.
- B: Phenols, ethers and carboxylic acid.
- C: Alcohols, phenols and ethers.
- D: Alcohols, ketones and phenols.

19. $C_2H_5OH + 4I_2 + 6NaOH$ ------------> ?

- A: $CHI_3 + HCOONa + 3NaI + 3H_2O$
- B: $C_2H_5I_3 + HCOONa + 5NaI + 5H_2O$
- C: $CHI_3 + HCOONa + 5NaI + 5H_2O$
- D: No yellow crystals.

20. Methanol is not used for which of the following?

- A: Solvent
- B: Antifreeze
- C: Denaturing of alcohol
- D: Preservative for specimen

Test 2

1. **Alcohols and phenols are much more closer to one another in which of the following aspects?**

- A: Structure
- B: Properties
- C: Both "a" and "b"
- D: None of the above

2. **What is the name of the reaction when $C_2H_5ONa + C_2H_5I$ gives an ether?**

- A: Hofmann's reaction
- B: Williamson's reaction
- C: Kolbe's reaction
- D: Wurtz's reaction

3. **$C_3H_5COCH_3 + HCN$ give a reaction in the presence of**

- A: Acid
- B: Base
- C: Neutral
- D: Reaction does not happen

4. **Primary, secondary and tertiary alcohols can be identified and distinguished by :**

- A: Bakwas Test
- B: Lucas Test
- C: Baeyer's Test
- D: Silvor Mirror Test

5. **Wheat happens when a nucleophile attacks an alcohol?**

- A: C-O bond breaks.
- B: O-H bond breaks.
- C: C-H bond breaks.
- D: All of the above.

6. **Phenol on distillation with zinc dust gives?**

- A: Acetylene
- B: Benzene
- C: Toulene
- D: Ethylene

7. **Which catalyst is used for the preparation of methanol on the industrial scale?**

- A: ZnS
- B: ZnO
- C: Cr_2O_3
- D: Both B and C

8. Phenol reacts with CH_3COCl to give which of the following?

- A: Acid
- B: Alcohol
- C: Aldehyde
- D: Ester

9. 2-Propanol oxidise in the presence of $K_2Cr_2O_7/H_2SO_4$ to give which of the following?

- A: Propanone
- B: Propanal
- C: Propene
- D: 2-propanal

10. In the fermentation of ethanol, two glucose molecules give how many ethanol molecules?

- A: 1 molecule
- B: 2 molecules
- C: 3 molecules
- D: 4 molecules

11. Alcohols are obtained by the reaction of grignard reagents with which of the following?

- A: Alkenes
- B: Aldehydes
- C: Ketones
- D: Both b and c

12. Alcohols can be obtained by which of the following processes?

- A: Hydrogenation of alkenes
- B: Hydration of alkenes
- C: Hydrogenation of alkynes
- D: Hydration of alkynes

13. Phenol undergoes hydrogenation in the presence on nickel catalyst at 200 ^{o}C and gives?

- A: n-Hexanol
- B: Cyclohexanol
- C: Cyclohexane
- D: Cyclohexene

14. Secondary alcohols oxidize in the presence of $K_2Cr_2O_7/H_2SO_4$ to give?

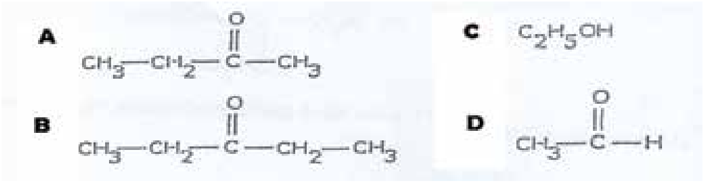
- A: Alkanes
- B: Aldehydes
- C: Acids
- D: Ketones

15. $2(C_6H_{10}O_5)_n + nH_2O$ -----------> $nC_{12}H_{22}O_{11}$ **Which enzyme is required for the conversion of starch to maltose?**

Starch Yeast Maltose

- A: Invertase
- B: Diastase
- C: Maltase
- D: Zymase

16. Iodoform test will not be positive with which of the following?



- A: A
- B: B
- C: C
- D: D

17. Which of the following is not a physical property of lower alcohols?

- A: Coloured
- B: Toxic
- C: Sweet smell
- D: Burning taste

18. Ethers are isomeric with which of the following?

- A: Ketones
- B: Acids
- C: Alcohols
- D: Aldehydes

19. IUPAC name of this Alcohol is?

CH_3-CH_2-CH-OH CH_3

- A: pri-Butyl alcohol
- B: sec-Butyl alcohol
- C: 1-Butanol
- D: 2-Butanol

20. Which of the following alcohol is converted to aldehyde with same number of carbon atoms in the presence of $K_2Cr_2O_7/H_2SO_4$?

- A: $CH_2C(CH)_2OH$
- B: $CH_3CH_2CH_2OH$
- C: $(CH_3)_3COH$
- D: $(CH_3)_2CHOH$

Test 3

1. Alcohols react with con.H_2SO_4 at 180°C to give which of the following?

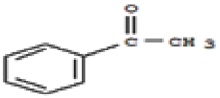
A: Ethane

B: Ethylene

C: Ether

D: Diethyl ether

2. What is the structure of alcohol which on oxidation with acidified $Na_2Cr_2O_7$ gives



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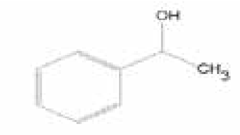
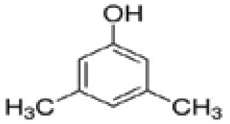
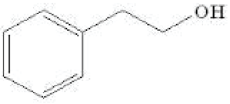
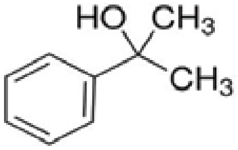
A: 

B: 

C: 

D: 

3. Ethanol and hydrogen chloride react to give ethyl chloride in the presence of which catalyst?

A: $ZnCl_2$

B: Pyridine

C: ThO_2

D: $K_2Cr_2O_7$

4. $2C_2H_5OH + 2Na$ ----------> $2C_2H_5ONa + H_2$ which alcohol bond is broken in this reaction?

A: C-O bond

B: C-H bond

C: O-H bond

D: None of the above.

5. Which of the following is true about the solubility of alcohols in water?

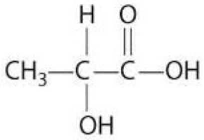
A: It remains constant from lower to higher alcohols

B: It increases from lower to higher alcohols

C: It decreases from lower to higher alcohols

D: First increase then decrease from lower to higher alcohols

6. **Which of the following is the common name of**

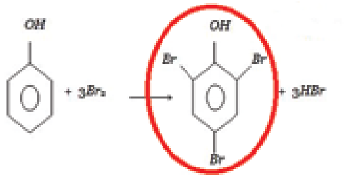


- A: Tartaric acid
- B: Lactic acid
- C: Picric acid
- D: Propionic acid

7. **Reacting alkyl halides with dry Ag_2O gives?**

- A: Alcohols
- B: Phenol
- C: Picric acid
- D: Ethers

8. **The reaction shows the halogenation of phenol. What is the name of the marked compound?**



- A: 2,4,6 – Tribromophenol
- B: 1,2,3 - Tribromophenol
- C: 2,4,6 – Hexabromophenol
- D: 1,2,3 – Tetrabromophenol

9. **Primary,secondary and tertiary alcohols can be distinguish and identified by which test?**

- A: Ninhydrin test
- B: Tollens test
- C: Idoform test
- D: Lucas test

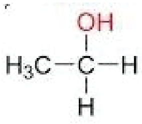
10. **During Lucas test, what would you expect if the testing alcohol is 2-Propanol?**

- A: It forms an oily layer immediately.
- B: It forms an oily layer in five to ten minutes.
- C: It forms an oily layer only on heating.
- D: It never forms an oily layer.

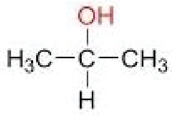
11. Which of the following is true regarding the IUPAC naming convention of unsaturated alcohols?

- A: Unsaturated alcohols cannot be named under IUPAC nomenclature.
- B: The number given to (-OH) groups or the point of unsaturation does not matter in IUPAC naming of alcohols.
- C: They are named in such a way that (-OH) groups get higher number than the point of unsaturation.
- D: They are named in such a way that (-OH) groups get lower number than the point of unsaturation.

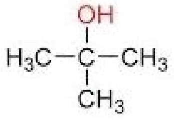
12. Which of the following is not a polyhydric alcohols?



A



B



C

- A: A
- B: B
- C: C
- D: None of them are polyhydric alcohols.

13. Sodium salt of benzene sulphonic acid reacts with NaOH to give?

- A: Benzene
- B: Benzoic acid
- C: Phenol
- D: Sodium phenoxide

CH_3

\

14. CH-OH : common name of this organic compound is?

/

CH_3

- A: 2-Methyl Ethanol
- B: Isopropyl alcohol
- C: Propanol
- D: 2-Propanol

15. What is the order of reactivity of alcohols when the C-O bond breaks?

A: Primary alcohol > Seconday alcohol > Tertiay alcohol

B: Primary alcohol > Tertiay alcohol > Seconday alcohol

C: Tertiay alcohol > Primary alcohol > Seconday alcohol

D: Tertiay alcohol > Seconday alcohol > Primary alcohol

16. Which of the following alcohols have the lowest reactivity when O-H bond breaks?

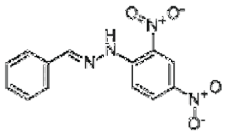
A: Tertiary alcohols

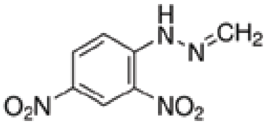
B: Secondary alcohols

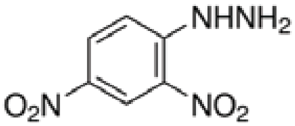
C: Primary alcohols

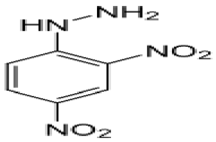
D: CH_3OH

17. The structural formula of the product of reaction of acetone with 2,4 dinitro phenyl hydrazine is?

A: 

B: 

C: 

D: 

18. Which of the following is not the essential condition for the fermentation of ethanol?

A: Aeration

B: Dilution of solution

C: Addition of nitrates

D: Absence of any preservative

19. Which of the following is not obtained through the fermentation of starch?

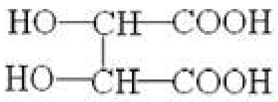
A: Glucose

B: Fructose

C: Maltose

D: Ethanol

20. Which of the following is the common name of the given alcohol?



A: Picric acid

B: Lactic acid

C: Tartaric acid

D: Dipropionic acid

Test 4

1. What would you expect in Lucas test if the testing substance is methanol?

- A: It forms oily layer immediately.
- B: It forms oily layer in 5-10 minutes.
- C: It forms oily layer only on heating.
- D: It never forms an oily layer.

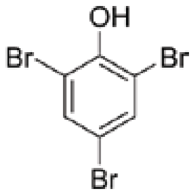
2. Methanol reacts with iodine in the presence of base to give which colour precipitate?

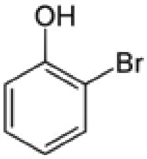
- A: Brick red ppt
- B: Yellow ppt
- C: Pink ppt
- D: No ppt

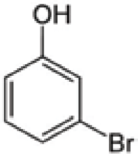
3. Acidic nature of phenol is due to?

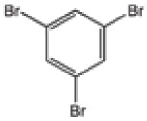
- A: Resonance stabilization of phenoxide ion.
- B: Hydrogen bonding.
- C: Phenolic group.
- D: Benzene ring.

4. Aqueous phenol decolorizes bromine water to form a white precipitate.What is the structure of white precipitate formed?

- A: 

- B: 

- C: 

- D: 

5. Ethanol can be distinguish from methanol by which test?

- A: Tollen's test
- B: Lucas test
- C: Ninhydrin test
- D: Iodoform test

6. Which one of the following is also called silver mirror test?

- A: Fehling's Solution Test
- B: Idoform test
- C: Tollens test
- D: Benedicts Test

7. The dehydration of ethyl alcohol with concenterated H_2SO_4 at 140 ^oC gives:

- A: Diethyl ether
- B: Alcohol
- C: Ethene
- D: Carboxylic acid

8. Which of the following alcohol can be made by the distillation of the wood?

- A: Methanol
- B: Ethanol
- C: 1-propanol
- D: 2-Butanol

9. The I.U.P.A.C. names of alcohols end with suffix?

- A: -al
- B: -oxy
- C: -ol
- D: -oic

10. 2-Methyl-2-Propanol on oxidation in the presence of acid dichromate gives which of the following?

- A: 2-Methyl-2-Propanone
- B: 2-Methyl-2-Propanal
- C: 2-Methyl-2-Acetone
- D: 2-Methylpropene

11. Which of the following is the correct sequence of processes in the industrial production of methanol?

- A: Purification --> Catalyst --> Compression --> Condenser
- B: Purification --> Compression --> Condenser --> Catalyst
- C: Compression --> Catalyst --> Condenser --> Purification
- D: Purification --> Compression --> Catalyst --> Condenser

12. C_2H_5OH +PCl_5 -----> ?

- A: $C_2H_5Cl + POCl_3 + HCl$
- B: $C_2H_6Cl_2 + POCl_3$
- C: $C_2H_5Cl + PCl_2 + HOCl_2$
- D: $C_2H_4 + POCl_3 + 2HCl$

13. In the industrial preparation of methanol mixture of CO and H_2or water gas is compressed at which pressure?

- A: 100 atmospheres
- B: 200 atmospheres
- C: 300 atmoaphere
- D: 400 atmospheres

14. Which enzyme is involved in the fermentation of glucose?

- A: Zymase
- B: Invertase
- C: Urease
- D: Diastase

15. Primary alcohols oxidize into aldehydes in the presence of which catalyst?

- A: $Cu + H_2SO_4$
- B: $V_2O_5 + H_2SO_4$
- C: $Al_2O_3 + H_2SO_4$
- D: $K_2Cr_2O_7 + H_2SO_4$

16. Which of the following undergoes nitration readily?

- A: Phenol
- B: Nitrobenzene
- C: Toulene
- D: Benzoic acid

17. The residue obtained after the crystallization of sugar from the sugar cane juice is called?

- A: Glucose
- B: Ethanol
- C: Starch
- D: Molasses

18. What is optimum temperature for the process of industrial fermentation of ethanol?

- A: 20-35 ºC
- B: 25-35 ºC
- C: 30-35 ºC
- D: 35-40 ºC

19. The formula for 2,4,6-tribromophenol is?

- A: A
- B: B
- C: C
- D: D

20. Which of the following is the common name of 2-Hydroxy propanoic Acid ?

- A: Tartaric acid
- B: Ethanoic acid
- C: Lactic acid
- D: Picric acid

Aldehydes & Ketones

TEST 1

1. **A water soluble compound of molecular formula C_3H_6O gives yellow color crystalline solid on heating with I_2 and Na_2CO_3. The compound is?**

A: $CH_2=CHCH_2OH$
B: $CH_2=CHOCH_3$
C: CH_3COCH_3
D: CH_3CH_2CHO

2. **A "-CHO" group can be present:**

A: At the second carbon atom of the carbon chain
B: Only at the end of of carbon atoms
C: In between carbon chains
D: At any position of carbon atoms

3. **Aldehydes react with which of the following to form acetals?**

A: Aldehydes
B: Ketones
C: Alkyl halides
D: Alcohols

4. **Symmetrical structure of a ketone refers to:**

A: Uneven number of carbon atoms on either side of the carbonyl group
B: Same number of carbon atoms on either side of the carbonyl group
C: Just 1 carbon more on the right side of the carbonyl group
D: Just 1 carbon more on the left side of the carbonyl group

5. **Acetones react with HCN to form a cyanohydrin. It is an example of?**

A: Electrophilic addition
B: Electrophilic substitution
C: Nucleophilic addition
D: Nucleophilic substitution

6. **Which one of the following compound is a ketone?**

A: CH_2-O-CH_2-CH_3
B: CH_3-CO-CH_2-CH_3
C: $CH_3COCOOH$
D: CH_3-CH_2CHO

7. **Formaldehyde give an addition product with methyl magnesium iodide which on aqueous hydrolysis gives:**

A: $CH_3CHOHCH_3$
B: C_2H_5OH
C: CH_3OH
D: $(CH_3)_2CHOH$

8. Which type of reaction is cannizaro's reaction?

- A: Disproportion reaction
- B: Self oxidation-reduction reaction
- C: Both of the above
- D: None of the above

9. Which of the following compounds will not give iodoform test on treatment with I_2/NaOH?

- A: Acetaldehyde
- B: Acetone
- C: Butanone
- D: 3-Pentanone

10. Which of the following product is prepared by the dry distillation of calcium acetate?

- A: Formic acid
- B: Acetic acid
- C: Acetone
- D: All of the above

11. Which of the following undergoes halform reaction ?

- A: HCHO
- B: $C_2H_5O_2CH_5$
- C: C_2H_5
- D: None of the above

12. Formalin is:

- A: 40% solution of CH_3CHO
- B: 60% solution of HCHO
- C: 100% solution of HCHO
- D: 40% solution of HCHO

13. In the oxidation of unsymmetrical ketones using strong oxidizing agents like conc. HNO_3, which carbon atom is preferentially attacked:

- A: Carbon atom with maximum number of hydrogen atoms
- B: Carbon atoms with least number of hydrogen atoms
- C: Alpha carbon
- D: Beta carbon

14. Methyl ketone is converted to carboxylic acid by haloform form reaction. The carboxylic acid formed has:

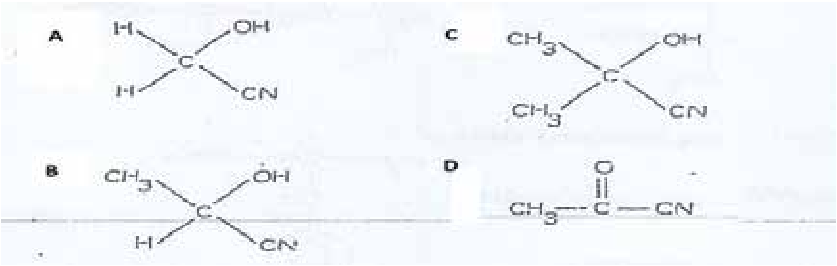
- A: One hydrogen atom less than parent compound
- B: One carbon atom less than parent compound
- C: One hydrogen and carbon atom less than parent compound
- D: Same number of carbon atom like parent compound

15. Which of the following compounds undergoes also condensation?

- A: C_2H_5CHO
- B: CH_3COCH_3
- C: CH_3CHO
- D: All of the above

Test 2

1. Formaldehyde reacts with HCN (NaCN + HCl) to give which of the following compounds?



- A: A
- B: B
- C: C
- D: D

2. Benzyl alcohol is obtained from benzaldehyde by:

- A: Aldol reaction
- B: Clemmenson's reaction
- C: Cannizaro's reaction
- D: Wurtz reaction

3. It is general formula of:

- A: 2,4-dinitrophenyl hydrazine
- B: 1,3-dinitrophenyl hydrazine
- C: Phenyl hydrazone
- D: None of the above.

4. Which statement is false regarding acetaldehyde and acetone:

- A: Both react with sodium bisulphite to form addition product
- B: Both react with hydrazine to form hydrazones
- C: Both react with hydroxylamine to form oximes
- D: Both reduce ammonical silver nitrate to give silver

5. Aldehydes on oxidation gives acids of:

- A: Same number as of the parent compound.
- B: Lesser number than the parent compound.
- C: More number than parent compound.
- D: None of the above.

6. **What is the minimum temperature required to prepare formaldehyde in the laboratory?**

- A: 500ºC
- B: 350ºC
- C: 550ºC
- D: 300ºC

7. **Formation of yellow or orange/red precipitates with 2,4-DNPH refers to the identification of:**

- A: Aldehydes
- B: Ketones
- C: Both of the above
- D: Pure alcohols only

8. **Bisulphite on heating with dilute mineral acids produce which of the following compound?**

- A: Aldehyde
- B: Ketone
- C: Both of the above
- D: None of the above

9. **The structural formula of the compound isomeric with acetone is:**

- A: C_3H_8O
- B: CH_3CHO
- C: CH_3CH_2OH
- D: CH_3CH_2CHO

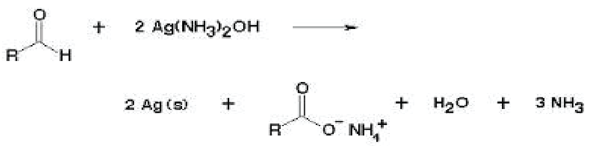
10. **Tollen's reagent is:**

- A: Alkaline solution containing K-tartrate
- B: Alkaline solution containing K-citrate
- C: Ammonical $AgNO_3$
- D: Ammonical Cu_2Cl_2

11. **Haloform test is given by:**

- A: Acetaldehyde
- B: Methyl group ketones
- C: Propanone
- D: All of the above

12. **Consider the following reaction:**



This reactions represents which of the following tests?

- A: Fehling's test
- B: Benedict's test
- C: Ninhydrin test
- D: Tollen's test

13. **Haloform test is used to distinguish:**

- A: Methyl ketones from other ketones.
- B: Ethanol from methanol.
- C: Both of the above.
- D: None of the above.

14. The clear fact for structural difference between and aldehyde and a ketone is:

- A: An aldehyde always has only one R group on any single side of the carbonyl group or two H atoms on either sides of carbonyl group
- B: Ketone must have two R groups on either sides of carbonyl group
- C: Both of the above
- D: Aldehydes have carbonyl group which has single bonded O atom while ketones have doubled bonded O atom

15. What is the hybridization of carbon in -CHO group?

- A: sp
- B: sp^2
- C: sp^3
- D: dsp^2

16. Formaldehyde is prepared in laboratory by passing the mixture of ______ over copper?

- A: Vapours of formic acid and air
- B: Dry formic acid and air
- C: Vapours of methanol and air
- D: Dry methanol and air

17. Fehling's solution is:

- A: Acidified $AgNO_3$
- B: Copper sulphate, sodium hydroxide and Rochelle salt
- C: Ammonical $AgNo_3$ solution
- D: Acidified $CuSO_4$ solution

18. Which of the following ketones will produce propanoic acid only after oxidation by acidified potassium dichromate:

- A: Ethyl n-propyl ketone
- B: Ethyl methyl ketone
- C: Dimethyl ketone
- D: Diethyl ketone

19. An alcohol giving positive 2,4-DNPH test implies that:

- A: It is 100% pure
- B: It may contain some contents of aldehydes and ketones
- C: It is ethanol
- D: None of the above

20. The yellow solid formed in idoform test is:

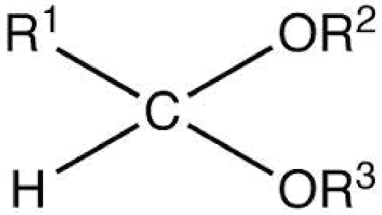
- A: Insoluble in organic compounds.
- B: Soluble in organic compounds.
- C: Insoluble in water.
- D: All except A.

Test 3

1. Calcium formate on heating gives:

- A: Methane
- B: Methanoic anhydride
- C: Formic acid
- D: Formaldehyde

2. Compound of general formula is known as:



- A: Diesters
- B: Hemiacetals
- C: Aldols
- D: Acetals

3.

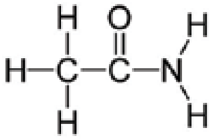
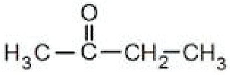
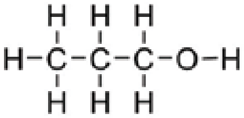
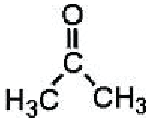
- A:

- B:

- C:

- D:

4. Which group gives a yellow precipitate of triiodomethane when warmed with alkaline aqueous iodine?

- A: An amide group, 
- B: Ethyl ketone group, 
- C: A primary alcohol group as in propanol, 
- D: Methyl ketone group, 

5. Which of the following compounds does not undergo Cannizaro's reaction?

- A: Acetone
- B: Methanal
- C: Benzaldehyde
- D: Trimethylacetaldehyde

6. Which of the following compounds produce unsaturated compounds by losing water on heating in the presence of a dilute acid?

- A: Bisulphite
- B: Cyanohydrins
- C: Aldols
- D: Hydrazones

7. Both aldehydes and ketones are planer to neighbourhood of carbonyl groups. Which one of the follwing bond is distorted towards oxygen atoms?

- A: n bond of C and O
- B: Sigma bond of C and H
- C: Sigma bond of C and O
- D: Sigma bond of C and C

8. Which of the following reaction is used for the separation and purification of carbonyl compounds from non-carbonyl compounds?

- A: Addition of grignard's reagents
- B: Addition of Hydrogen cyanide
- C: Addition of sodium bisulphate
- D: None of the above

9. Primary alcohols normally give us aldehydes when oxidized in the presence of $Na_2Cr_2O_7$, what the product will be when secondary alcohols are oxidized in the same condition?

- A: Alkenes
- B: Alkynes
- C: Ketones
- D: Alkyl halides

Test 4

1. The general formula of aldehydes is:

- A: $C_nH_{2n}O$
- B: C_nH_{2n}
- C: $C_nH_{2n}OH$
- D: $C_nH_{2n+2}O$

2. Which of the following compound is used to produce to acetaldehyde at industrial scale?

- A: Ethyl alcohol
- B: Ethanoic acid
- C: Ethylene
- D: Any of the above can be used

3. Accoring to I.U.P.A.C system aldehydes are:

- A: Alkenes
- B: Alkanals
- C: Alkynes
- D: alkanes

4. Which of the following compounds does not undergo aldol condensation?

- A: Benzaldehyde
- B: Ethyl methyl ketone
- C: Phenyl acetaldehyde
- D: Acetaldehyde

5. When two molecules of HCHO react in presence of a base to produce CH_3OH and HCOONa, the reaction is called:

- A: Clemmenson's condensation
- B: Aldol condensation
- C: Cannizaro's reaction
- D: Wurtz reaction

6. When a ketone is condensed into an aldol, the reagent used is:

- A: Cl_2
- B: Br_2 water
- C: Alkali
- D: $NaHCO_3$

7. Acetaldehyde can be prepared by dry distillation of:

- A: Calcium salts of formic acid
- B: Calcium salts of acetic acid
- C: Calcium salts of formic acids or acetic acid
- D: Calcium salts of formic acid and acetic acid

8. **Addition of unsymmetrical reagent to an unsymmetrical alkene is governed by :**

- A: Cannizaro's Reaction
- B: Krichoff rule
- C: Aldol Condensation
- D: Markownkov's rule

9. **Catalyst used for laboratory preparation of formaldehyde is:**

- A: Cd-Asbestos
- B: Pb-Asbestos
- C: Pt-Asbestos
- D: Cu-Asbestos

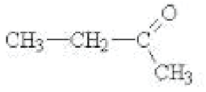
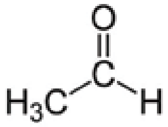
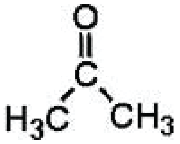
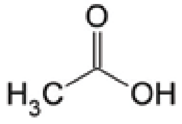
10. **One of the following compounds does not have α-hydrogen. Which is that?**

- A: Acetone
- B: Phenylacetaldehyde
- C: Formaldehyde
- D: Acetaldehyde

11. **Bisulphite on heating with dilute mineral acids produce which of the following compound?**

- A: Aldehyde
- B: Ketone
- C: Both of the above
- D: None of the above

12. **Which of the compounds will react with tollen's reagent :**

- A: 
- B: 
- C: 
- D: 

13. **Which of the following product is formed in cannizaro's reaction?**

- A: Alcohol
- B: Alkyl halide
- C: Acidic salt
- D: All except B

14. **Which of the following can give positive tri-iodo methane (CHI_3) test:**

- A: Dimethyl ketone
- B: Ethanal
- C: Ethyl methyl ketone
- D: All of the above

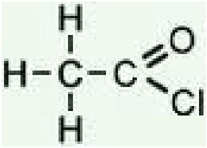
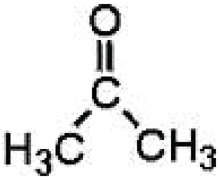
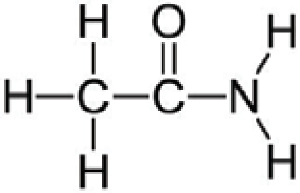
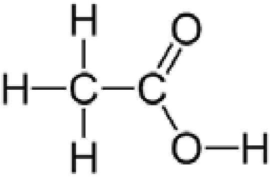
15. **How many molecules of aldehyde is/are involved in cannizaro's reaction?**

- A: One
- B: Two
- C: Three
- D: Four

16. **CH_3CHO and HCHO differ from each other towards:**

- A: Ammonical $AgNO_3$
- B: Ammonia
- C: Fehling's solution
- D: Schiff's reagent

17. **Which of the following is the structure of a ketone?**

- A: 
- B: 
- C: 
- D: 

18. **Acidified hydrolysis of cyanohydrins forms which of the following?**

- A: Carboxylic acids
- B: Alcohols
- C: hydroxy-carboxylic acids
- D: Aldols and ketols

19. **Aldol condensation of acetaldehyde results in the formation of:**

- A: $CH_3CH_2OH + CH_3COOH$
- B: CH_3-CH_2-CHOH-CHO
- C: CH_3-CO-CHO-CH_3
- D: CH_3-CHOH-CH_2-CHO

20. **Silver mirror test is given by:**

- A: Ethers
- B: Ketones
- C: Acids
- D: Aldehydes

Carboxylic & Amino Acids

TEST 1

1. How many aliphatic acids are colorless liquids and have pungent smell?

- A: First two
- B: First three
- C: First four
- D: First five

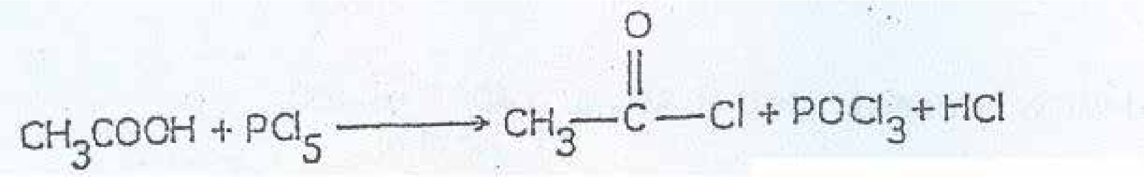
2. The dilute solution of Acetic acid is called _____________?

- A: Rectified spirit
- B: Methylated spirit
- C: Vinegar
- D: Alcohol

3. Esters have __________ smell?

- A: Pungent
- B: Sweet
- C: Fruity
- D: Esters are non-smelling.

4.



In the above reaction the nucleophile that attacks on the carbon atom of the acid is:

- A: P
- B: Cl^-
- C: H^-
- D: OH^-

5. The IUPAC names of saturated monocarboxylic acids are:

- A: Alcoholic acids
- B: Aldehydic acids
- C: Alkanoic acids
- D: Carboxylic acids have no IUPAC names.

6. $C_{15}H_{31}COOH$ is the formula of which of the following fatty acids?

- A: Stearic acid
- B: Oxalic acid
- C: Palmitic acid
- D: Butyric acid

7. **The amino acids which our body is unable to synthesize and thus one has to take from outside are called___________?**

- A: Non-essential
- B: Essential
- C: α--Amino acid
- D: β--Amino acid

8. **Ethanedioc acid is also called___________?**

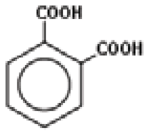
- A: Methanoic acid
- B: Acetic acid
- C: Phthalic acid
- D: Oxalic acid

9. **1,2- Benzenedicarboxylic acid is also called:**

- A: Malonic acid
- B: Benzoic acid
- C: Phthalic acid
- D: Oxalic acid

10. **If a large number of amino acids (100-1000) are joined by peptide bonds, resulting polymide is called a_______?**

- A: Peptide
- B: Amide
- C: Polyamide
- D: Polypeptide



11. **The given strucure is of which acid?**

- A: Benzoic acid
- B: Benzaldehyde
- C: Phthalic acid
- D: Malonic aicd

12. **Ethyl butyrate has a flavour of?**

- A: Apple
- B: Pineapple
- C: Apricot
- D: Banana

13. **Which of the following is not an amino acids**

- A: glumatic acid
- B: lactic acid
- C: aspartic acids
- D: glycine

14. Which acid is used in the manufacture of synthetic fibre?

- A: Formic acid
- B: Oxalic acid
- C: Carbonic acid
- D: Acetic acid

15. Which of the following is the most important Carboxylic acid?

- A: Formic acid
- B: Oxalic acid
- C: Stearic acid
- D: Acetic acid

16. The test which is used for the identification of amino-acids is

- A: Benedict Test
- B: Solution Test
- C: Ninhydrin Test
- D: Saturation Test

17. The melting points of carboxylic acids containing even number of carbon atoms is ____________ than those containing odd number of carbon atoms.

- A: Lower
- B: Higher
- C: Equal
- D: Sometimes increases, Sometimes decreases

18. Compounds containing both amino and carboxylic acid groups are called_________?

- A: Acidic anhydrides.
- B: Amides
- C: Amino acids
- D: Acetamides

19. The colour of acetic acid is?

- A: Blue
- B: Red
- C: Silver
- D: Colourless

20. Which of the following is a peptide linkage?

- A: -CO linkage
- B: -CN linkage
- C: -NP linkage
- D: None of these

Test 2

1. The boiling points of carboxylic acids are relatively high due to the presence of?

A: Acidic group

B: High carbon ratio

C: Hydrogen bonding

D: -COOH group

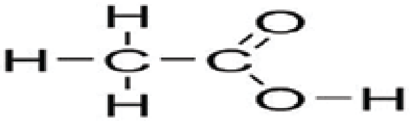
2. Which of the following process is used for the preparation of amino acids?

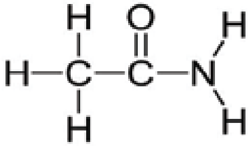
A: Wurtz Fitting reaction.

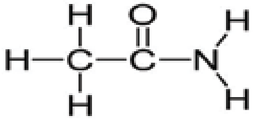
B: Grignard reaction

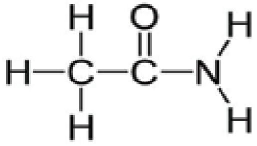
C: Strecker synthesis

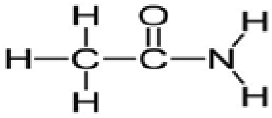
D: Cannizzaro's reaction

3.  **+ NH_3 + Heat ------------> ?**

A:  **+ CO_2**

B:  **+ H_2**

C:  **+ H_2O**

D:  **+ HCl**

4. The common name of propane 1 3-dioic is:

A: Oxalic acid

B: Aromatic acid

C: Malonic acid

D: Fumaric acid

5. Which of the following is a chemical formula for a Grignard reagent?

A: CH_3Cl

B: CH3-O-CH_3

C: CH_3-MgBr

D: CH_3MgR

6. A peptide having molecular mass more than 10,000 is called?

A: Polymide

B: Polypeptide

C: Amide

D: Protein

7. The name of the compound $CH_3 - CO - NH_2$ is ?

- A: Ammonium Alcohol
- B: Ethanide alcohol
- C: Acetamide
- D: Aaetic Anhydride

8. Which of the following methods is not used for the general preparation of Carboxylic acids?

- A: By the oxidation of primary alcohols
- B: From grignard reagent
- C: By the distillation of calcium acetate.
- D: By the hydrolysis of esters

9. Compounds containing a cyanide group are called ________________?

- A: Carboxylic
- B: Aliphatic
- C: Cynic
- D: Nitriles

10. The amino acids which are formed in the human body are called?

- A: Essential amino acids
- B: Non essential amino acids
- C: Alpha amino acids
- D: Delta amino acids

11. Organic compounds containing both carboxyl and amino groups are called:

- A: Fatty acid
- B: Amino acid
- C: Saccharide
- D: Amide

12. Which method is not used for the preparation of acetic acid?

- A: Oxiadtion of alcohols
- B: Oxidation of Aldehydes
- C: Oxidation of ketones
- D: All of the above

13. In basic conditions amino acids exists in which of the following forms?

- A: H_3N^+-CH_2-COOH
- B: H_2N-CH_2-COO^-
- C: H_3N^+-CH_2-COO^-
- D: H_2N-CH_2-COOH

14. Which one of the following reagent is used in the identification of amino acids?

- A: Fehling's reaction
- B: Benedicts Solution
- C: Ninhydrin
- D: Copper sulphate

15. Carboxylic acids can be prepared by the action of Grignard Reagent with__________?

- A: First CO_2 then adding HCl in the addition product
- B: First HCl then adding CO_2 in the addition product.
- C: Only CO_2
- D: Only HCl

16. Carboxylic acids react with ammonia to form ____________?

- A: Acid amides
- B: Ammonia
- C: Ammonium salts
- D: Cyanides

17. The trend of solubility of Carboxylic acids in water is that Solubility _____________ with the increase in molecular mass.

- A: Increases
- B: Decreases
- C: First increases then decreases
- D: First decreases then increases

18. The compound formed by the condensation of two or more α-amino acids are called?

- A: Amides
- B: Amines
- C: Peptides
- D: Polypeptides

19. Methyl cyanides, on boiling with mineral acids or alkalies,yield:

- A: Butanoic acid
- B: Acetic acid
- C: Formic acid
- D: Propanoic acid

20. Which dehydrating agent is used during the formation of acidic anhydride by the dehydration of carboxylic acid?

- A: $KMnO_4$
- B: $K_2Cr_2O_7$
- C: P_2O_5
- D: H_2SO_4

Test 3

1. **Which character is produced when an acid is added to an amino acid?**

- A: Basic character
- B: Acidic character
- C: Neutral character
- D: None of the above

2. **The amino acids exist in the form of dipolar ions which are called?**

- A: Internal salt
- B: Zwitter ion
- C: Both (A) and (B)
- D: Aldols

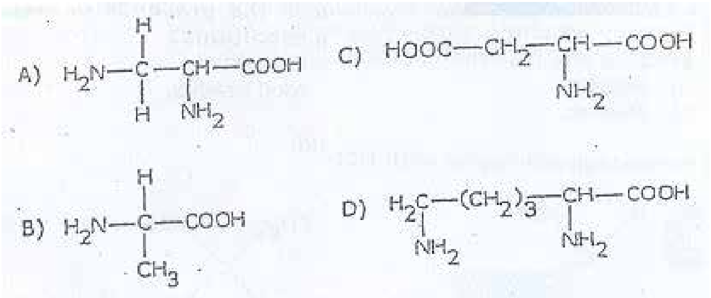
3. **The process used for the preparation of amino acids in which Hydrogen cyanide is added to an aldehyde in the presence of ammonia is called?**

- A: Clemmenson's process
- B: Wolf Kishner's method
- C: Strecker synthesis.
- D: Grignard process

4. **Which alcohol on oxidation with $K_2Cr_2O_7$ and dilute H_2SO_4 produces acetic acid?**

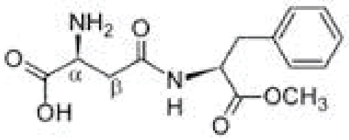
- A: Methanol
- B: Ethanol
- C: Butanol
- D: All of the above

5. **When ethanoyl chloride reacts with methyl amine an amide is formed. What is the structure of the amide formed:**



- A: A
- B: B
- C: C
- D: D

6. **The skeletal formula of dipeptide formed between aspartic acid and phenylalanine is given below as:**



How many functional groups are present in this formula?

- A: 1
- B: 2
- C: 3
- D: 4

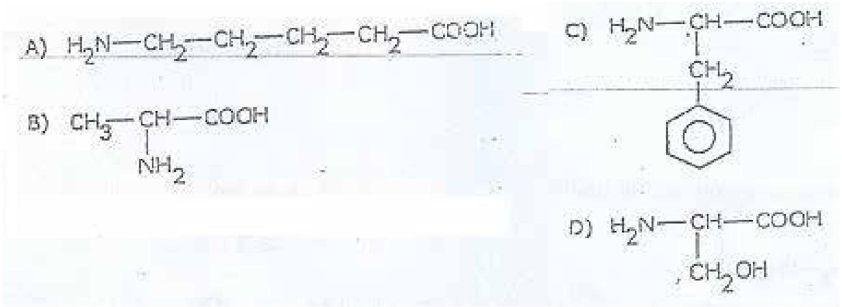
7. **What happens when alkenes are heated with alkaline $KMnO_4$?**

- A: Ethers are formed
- B: Aldehydes are formed
- C: Ketones are formed
- D: Carboxylic acids are formed.

8. **The acidic character of amino acids is due to which group?**

- A: Carboxylic group
- B: Amino group
- C: The central carbon
- D: All of these

9. **Which of the following structures is not an α-amino acid?**



- A: A
- B: B
- C: C
- D: D

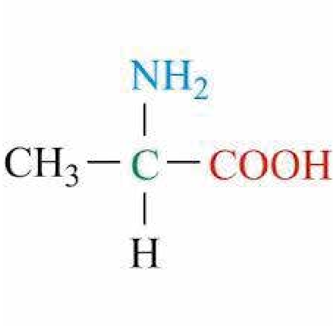
10. **Ninhydrin reacts with amino acid to form which colored product?**

- A: Violet
- B: Blue
- C: Bluish-Violet
- D: Bluish yellow

11. Alkenes when heated with ______________ are cleaved at double bond to form carboxylic acids?

- A: K_2SO_4
- B: $K_2Cr_2O_7$
- C: Alkaline $KMnO_4$
- D: Alcoholic KOH

12. What is the name of amino acid in the figure below?



- A: Glycine
- B: Lysine
- C: Aspartic acid
- D: Alanine

13. The ninhydrin test is used to visualise amino acids separated by which process?

- A: Crystallization
- B: Sublimation
- C: Filtration
- D: Paper- Chromatography.

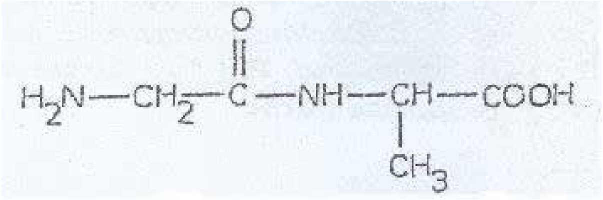
14. Carboxlic acid after reacting with ammonia and then heated produce ______________?

- A: Ammonium salts
- B: Amino acids
- C: Acid amides
- D: Cyanides

15. Carboxylic acids on reaction with lithium aluminum hydride are partially reduced to _________?

- A: Alkanes
- B: Ethers
- C: Alcohols
- D: This reaction does not take place.

16. **Styructure of dipeptide is :**



This is called?

- A: Glycyl alanine
- B: Glycyl glycine
- C: Alaninyl alanine
- D: Alaninyl glycine

17. **Organic compounds X and Y both can react with Na metal to evolve hydrogen gas. X and Y if react with each other form an organic compound Z which gives fruity smell. What type of compounds X,Y and Z are?**

- A: X = Alcohol Y = Ester, Z = Acetic acid
- B: X = Alcohol Y = Ester, Z = Mineral acid
- C: X = Alcohol, Y= Acetic acid, Z = Ester
- D: X = Alcohol, Y=Mineral Acid , Z = Ester

18. **What is Correct about the formation of Z witter ion?**

- A: Proton goes from amino group to Carboxyl group.
- B: Positive charge is present on Carboxyl group.
- C: Proton goes from Carboxyl group to amino group.
- D: Negative charge is present on amino group.

19. **Which of the following reaction is not given by a carboxylic acid?**

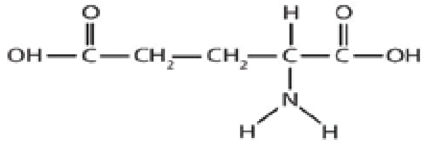
- A: Salt formation reactions
- B: Reaction in which OH group is replaced.
- C: The reaction involving carboxyl group as a whole.
- D: It undergoes all above type of reactions.

20. **The addition of a nucleophile to carboxylic acids is always followed by the displacement of ___________ by some other group producing a carboxylic acid derivative?**

- A: H-atom
- B: -COOH group
- C: C=O group
- D: -OH group

Test 4

1. **Which one of the following has this formula ?**



- A: Acetic acid
- B: Glutamic acid
- C: Ether
- D: Alcohol

2. **Which of the following group is replaced when esters are formed by the reaction of carboxylic acids and alcohols?**

- A: -H
- B: -OH
- C: -COOH
- D: C=O

3. **Which of the following is the flavour of octyl acetate.**

- A: Mango
- B: Banana
- C: Orange
- D: Apple

4. **The formation of ester from acetic acid in the presence of acid and ethanol is a :**

- A: Nucleophilic addition reaction
- B: Nucleophilic substitution reaction
- C: Electrophilic substitution reaction
- D: Electrophilic addition reaction

5. **Glycine is the name of an amino acid because**

- A: Sweet taste
- B: Bitter taste
- C: Shining appearance
- D: Green colour

6. **Two or more amino acids condensed to form protein by a peptide linkage which is present between two atoms of:**

- A: C and C
- B: C and N
- C: C and H
- D: C and O

7. Carboxylic acid on reduction with HI / phosphorous yields

- A: Aldehydes
- B: Alcohols
- C: Alkanes
- D: Ketones

8. Which of the following acid is formed when CH_3-MgBr reacts with O=C=O in the presence of dry ether and then the acidic hyrdolysis of the product formed.

- A: Formic acid
- B: Acetic acid
- C: Carbonic acid
- D: Malonic acid

9. The chemical nature of Glycine H_2N-CH_2-COOH is that it is__________ in nature?

- A: Neutral
- B: Acidic
- C: Basic
- D: None of the above.

10. The amino acid given in the below diagram is ______ amino acid?

$$NH_2\text{--}CH_2\text{--}CH_2\text{--}CH_2\text{--}COOH$$

- A: α-Amino acid
- B: β-Amino acid
- C: γ-Amino acid
- D: None of these.

11. Which of the following is formed, when Carboxlic acids heated with alcohols in the presence of conc. H_2SO_4?

- A: Ethers
- B: Ketones
- C: Salts
- D: Esters

12. Alkane nitriles(R-CN) can be prepared by treating alkyl halide with ______________?

- A: Nitrogen cyanide
- B: Alkyl cyanide
- C: Potassium cyanide
- D: Alcoholic Potassium cyanide

13. Aliphatic monocarboxylic acids are prepared by the hydrolysis of:

A: Fats and lipids

B: Fats and oils

C: Lipids and proteins

D: Fats and proteins

14. Which one of the following is an example of condensation polymer?

A: Polyvinylchloride

B: Polystyrene

C: Polythene

D: Polyamide

15. Almost all the naturally occuring amino acids are _____________?

A: α-Amino acid

B: β-Amino acid

C: γ-Amino acid

D: None of these

16. Which one of following amino acid is neither acidic nor a basic in nature?

A: Lysine

B: Histidine

C: Proline

D: Glutamic acid

17. Which of the following can differ in an amino acid?

A: R-group

B: Carbony -group

C: Amino –group

D: Oxygen in a carboxyl group

18. The common thing in phthalic acid and malonic aciid is that both are:

A: Aromatic

B: Dicarboxylic

C: Hydrocarbons

D: Strong acids

19. If 18.0 grams of glucose is dissolved in 1 Kg of water,boiling point of this solution should be:

A: 100.52^oC

B: 100.052^oC

C: 100.00^oC

D: Less than 100^oC

20. In low pH or acidic condition amino acids act as :

A: Anion

B: Cation

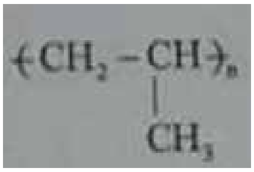
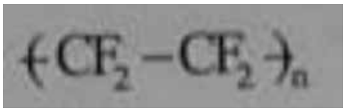
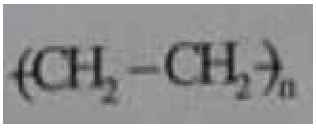
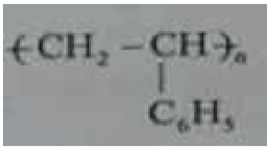
C: Zwittor ion

D: Neutral specie

Macro- Molecules

TEST 1

1. Which one of the following is the structure of polystyrene?

- A: 
- B: 
- C: 
- D: 

2. The molecular mass of the polymer is the product of :

- A: M.M of all repeating units and M.M of 1 repeating unit
- B: DP and M.M of all repeating units
- C: M.M of repeating unit and DP
- D: None of these.

3. How many strands are there in a RNA?

- A: 1
- B: 2
- C: 3
- D: 4

4. The amount of free acid present in a fat or oil determines its?

- A: Saponification number
- B: Iodine number
- C: Acid number
- D: Rancid number

5. How many total carbon atoms are present in all the 4 rings of the perhydrocyclopentanophenanthrene, the parent nucleus of sterols?

- A: 12
- B: 16
- C: 17
- D: 18

6. The enzymes have a ability to catalyze the reactions upto __________ times?

- A: 10^{21}
- B: 10^{20}
- C: 10^{18}
- D: 10^{16}

7. Polyvinyl acetate (PVA) is colourless and non-toxic resin used as an adhesive and as a binder for making:

- A: Emulsion paints
- B: Toys
- C: Gramophone
- D: Compact discs

8. Enzymes with exceptions are actually _________ in nature?

- A: Carbohydrates
- B: Lipids
- C: Fats
- D: Proteins

9. Among the most common disachride, which one of the following is present in milk?

- A: Sucrose
- B: Maltose
- C: Fructose
- D: Lactose

10. Polyvinyl chloride is an example of:

- A: Condensation polymer
- B: Biopolymer
- C: Addition polymer
- D: Thermosetting polymer

11. Which type of linkage is present in Disaccharides?

- A: Peptide linkage
- B: Ether linkage
- C: Glycosidic linkage
- D: Alcholic linkage

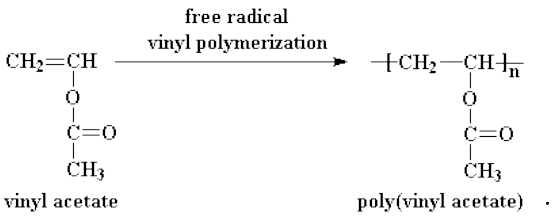
12. Starch is a polmer of _________?

- A: Fructose
- B: α- D-glucose
- C: β- D- glucose
- D: Lactose

13. The principle energy storage carbohydrate in animals is :

- A: Glucose
- B: Starch
- C: Glycogen
- D: Protein

14. Which type of polymeriztion process is this?



- A: Addition polymerization
- B: Condensation Polymerization
- C: Thermosetting polymerization
- D: Thermoplastic polymerization

15. Which of the following is incorrect about monosaccharides?

- A: They are simple sugars
- B: They cannot be hydrolysed
- C: They can be hydrolysed
- D: Glucose and fructose are thier examples

16. Adinine and Guanine are included in which type of Nitrogenous bases?

- A: Purines
- B: Pyrimidenes
- C: Both
- D: These are not nitrogenous bases

17. Glucose and fructose are common examples of:

- A: Pentose
- B: Hexoses
- C: Heptoses
- D: Butoses

18. Which of the following is correct about PVC's?

- A: It is formed by condensation polymerization
- B: It is formed by addition polymerization
- C: It is a thermosetting polymer
- D: It is a terpolymer.

19. Enzymes are actually __________ in nature.

- A: Carbohydrates
- B: Fats
- C: Lipids
- D: Proteins

20. The molecular weight of glyceroltripalmitate is?

- A: 208
- B: 168
- C: 1400
- D: 807

Test 2

1. Macromolecules are defined as large molecules built up from small repeating units called:

- A: Monomers
- B: Isomers
- C: Metsmers
- D: Tautomers

2. Polymide is formed due to condensation of hexane-dioc acid with :

- A: Hexane-1,5 diamine
- B: Hexane-1,6 diamine
- C: Hexane-1,4 diamine
- D: Hexane-2,5 diamine

3. What is the characteristic of enzymes about their direction?

- A: They catalyse in forward direction only
- B: They catalyse in backward direction only
- C: They catalyse in both directions
- D: They don't catalyse reactions

4. PVC is an example of which of the following?

- A: Addition polymer
- B: Condensation polymer
- C: Bioploymer
- D: Thermosetting polymer

5. Which compound has a structure in which two of the hydroxyl groups are esterified with fatty acids and third forms a link with phosphoric acid or a derivative of phosphoric acid?

- A: Steroids
- B: Lipids
- C: Phospholipids
- D: Nucleic acids

6. What will be the catalyst in the following reaction:

$$Triglyceride + 3H_2O \xrightarrow{?} Glycerol + 3Fattyacids$$

- A: Proteins
- B: Sulphuric acid
- C: Sugars
- D: Lipases

7. Adipic acid and hexamethylene diamine , both of these have _______ carbon atoms.

- A: Seven
- B: Eight
- C: Four
- D: Six

8. Enzymes are classified into ho many types?

- A: 2
- B: 4
- C: 5
- D: 6

9. The increased quantities of chloestrol in blood make plaque like deposits in the arteries causing:

- A: Cholera
- B: Heart attack
- C: Down's syndrome
- D: Phenylketoneuria

10. How much amylopectin is present in natural starch?

- A: 10%
- B: 10-20%
- C: 40-60%
- D: 80-90%

11. The enzymatic reaction occurs best at what temperature?

- A: $30^{o}C$
- B: $35^{o}C$
- C: $37^{o}C$
- D: $40^{o}C$

12. What is the action of radiations on the enzymes?

- A: They are activated
- B: They are inactivated
- C: They give fast reaction
- D: Denatured

13. Both ribose and deoxyribose are monosaccharide's containing _______ carbon atoms.

- A: Four
- B: Five
- C: Six
- D: Seven

14. Activators are ___________ substances that increase enzymatic activity.

- A: Organic
- B: Inorganic
- C: Ionic
- D: All of these

15. Starch is a polymer of:

- A: α - D Glucose
- B: β - D Glucose
- C: γ - D Glucose
- D: α - L glucose

16. The long chain formula of which compound was not proposed by Staudinger?

- A: Polystyrene
- B: Rubber
- C: Vinyl acetate
- D: Polyoxymethylene

17. What happens when a plasticizer is added to a polymer?

- A: It reduces the flexibility
- B: It improves the quality
- C: It improves the flexibility
- D: It improves the strength.

18. Animals store glucose in the form of ___________?

- A: Starch
- B: Glycogen
- C: Lipids
- D: They cannot store.

19. Which condition is responsible for the conversion of Ergo sterol into Vitamin D_2 and ergocalceferol?

- A: Heating
- B: Cooling
- C: Irradiated with U.V rays
- D: Melting

20. Terylene, a polyester is an example of:

- A: Bioploymer
- B: Lipids
- C: Condensation polymer
- D: Addition polymer

Test 3

1. Which type of glycosidic linkage is present in Amylopectin?

- A: 1-4 glycosidic linkage
- B: 1-6 glycosidic linkage
- C: Both glycosidic linkages
- D: None of these

2. The conversion of fumaric acid to maleic acid in the presence of fumarase enzymes. This is an example of which category of enzymes?

- A: Lyases
- B: Hydrolases
- C: Isomerases
- D: Ligases

3. The hydrolysis of fats and oils with an alkali to form soap and glycerol is called _________?

- A: Hydrolysis
- B: Hardening of oils
- C: Saponification
- D: Softening of fats

4. Which enzyme is used for the treatment of rickets and obstructive jaundice?

- A: LDH-1
- B: L-asparagenase
- C: Thrombin
- D: Alkaline phosphates

5. Hexokinase catalyses the conversion of hexoses like glucose, fructose and mannose to their ________?

- A: Branched structure
- B: Cyclic structure
- C: 6-Phosphate derivative
- D: Isomers

6. Which one is correct for ligases?

- A: They catalyze a reaction
- B: They transfer different groups
- C: They yield isomers
- D: Link two molecules together.

7. Which one is involved in putting the genetic information to work in the cell?

- A: DNA
- B: RNA
- C: Both
- D: rRNA

8. Which one does not occur in RNA?

- A: Cytosine
- B: Thymine
- C: Uracil
- D: Guanine

9. is structure of?

- A: Thiamine
- B: -tocopherol
- C: Calciferol
- D: Menadoine

10. Raffinose is a:

- A: Monosaccharide
- B: Disaccharide
- C: Trisaccharide
- D: None of these

11. What kind of change occurs in thermosetting plastics on heating?

- A: It melts
- B: It becomes hard
- C: It decomposes
- D: It sublimes

12. Saponification number is defined as the number of __________ of KOH or NaOH to Saponify one gram of fat or oil

- A: Grams
- B: Milligram
- C: Kg
- D: Pounds

13. Different enzymes are used for the treatment of different diseases. Which enzyme is raised in Heart diseases?

- A: Alkaline phosphate
- B: Thrombin
- C: LDH-1
- D: L-asparagines

14. What will be correct for the relation of concentration of enzymes to the rate of reaction?

- A: Directly proportional
- B: Inversely proportional
- C: Directly proportional to the square root of enzmes
- D: Inversely proportional to the square root of enzymes

15. If the Molecular mass of the repeating unit is 60 and the degree of polymerization is 30. What will be the Molecular mass of that polymer?

- A: 2
- B: 60
- C: 900
- D: 1800

16. Which one is not included in Pyrimidenes?

- A: Cytosine
- B: Uracil
- C: Guanine
- D: Thymine

17. Pentose's and Hexodes are most stable in which form?

- A: Straight chains
- B: Branched chains
- C: Interconnect 3 dimensional
- D: Cyclic structure

18. The molecular mass of Polyvinyl chloride having DP 1000, is _______?

- A: 63
- B: 1000
- C: 6300
- D: 63000

19. How many rings are present in parent nucleus of steroids?

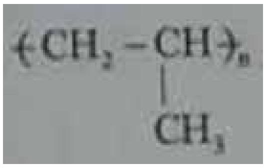
- A: 1
- B: 2
- C: 3
- D: 4

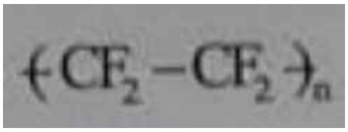
20. Cholesterol is the precursor of?

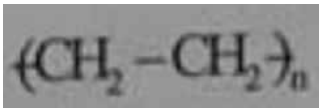
- A: Enzymes
- B: Lipids
- C: Steroid hormones
- D: Fats

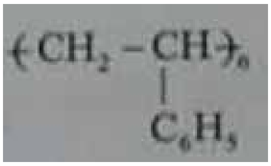
Test 4

1. Which one of the following is the structure of polystyrene?

A: 

B: 

C: 

D: 

2. The molecular mass of the polymer is the product of :

A: M.M of all repeating units and M.M of 1 repeating unit

B: DP and M.M of all repeating units

C: M.M of repeating unit and DP

D: None of these.

3. How many strands are there in a RNA?

A: 1

B: 2

C: 3

D: 4

4. The amount of free acid present in a fat or oil determines its?

A: Saponification number

B: Iodine number

C: Acid number

D: Rancid number

5. How many total carbon atoms are present in all the 4 rings of the perhydrocyclopentanophenanthrene, the parent nucleus of sterols?

A: 12

B: 16

C: 17

D: 18

6. The enzymes have a ability to catalyze the reactions upto __________ times?

A: 10^{21}

B: 10^{20}

C: 10^{18}

D: 10^{16}

7. Polyvinyl acetate (PVA) is colourless and non-toxic resin used as an adhesive and as a binder for making:

- A: Emulsion paints
- B: Toys
- C: Gramophone
- D: Compact discs

8. Enzymes with exceptions are actually _________ in nature?

- A: Carbohydrates
- B: Lipids
- C: Fats
- D: Proteins

9. Among the most common disachride, which one of the following is present in milk?

- A: Sucrose
- B: Maltose
- C: Fructose
- D: Lactose

10. Polyvinyl chloride is an example of:

- A: Condensation polymer
- B: Biopolymer
- C: Addition polymer
- D: Thermosetting polymer

11. Which type of linkage is present in Disaccharides?

- A: Peptide linkage
- B: Ether linkage
- C: Glycosidic linkage
- D: Alcholic linkage

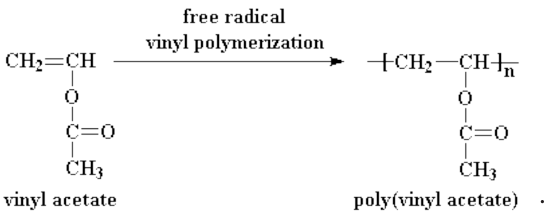
12. Starch is a polmer of _________?

- A: Fructose
- B: α- D-glucose
- C: β- D- glucose
- D: Lactose

13. The principle energy storage carbohydrate in animals is :

- A: Glucose
- B: Starch
- C: Glycogen
- D: Protein

14. Which type of polymeriztion process is this?



- A: Addition polymerization
- B: Condensation Polymerization
- C: Thermosetting polymerization
- D: Thermoplastic polymerization

15. Which of the following is incorrect about monosaccharides?

- A: They are simple sugars
- B: They cannot be hydrolysed
- C: They can be hydrolysed
- D: Glucose and fructose are thier examples

16. Adinine and Guanine are included in which type of Nitrogenous bases?

- A: Purines
- B: Pyrimidenes
- C: Both
- D: These are not nitrogenous bases

17. Glucose and fructose are common examples of:

- A: Pentose
- B: Hexoses
- C: Heptoses
- D: Butoses

18. Which of the following is correct about PVC's?

- A: It is formed by condensation polymerization
- B: It is formed by addition polymerization
- C: It is a thermosetting polymer
- D: It is a terpolymer.

19. Enzymes are actually __________ in nature.

- A: Carbohydrates
- B: Fats
- C: Lipids
- D: Proteins

20. The molecular weight of glyceroltripalmitate is?

- A: 208
- B: 168
- C: 1400
- D: 807